

# AUTOMOTIVE INDUSTRIES

PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY  
PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT

ENGINEERING • PRODUCTION • MANAGEMENT

**FEBRUARY 15, 1950**

***In This Issue . . .***    **Kaiser-Frazer's Small Car and Other 1951 Models**  
                                 **Allison-Developed Heavy Duty Bearing Tester**  
                                 **Experimental Underdrive and Overdrive Units**  
                                 **Hot-Skinning of Thin Sheet Metal**  
                                 **Aviation Tooling for Aircooled Military Engines**

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**A CHILTON PUBLICATION**



# perfect concentricity

on very small work...at half the cost

*Remember...*  
*when it comes to*  
*precision grinding and finishing*  
*it pays to come to Heald*  
*when Maximum Results count*

**THE HEALD MACHINE COMPANY • Worcester 6, Mass.**  
 Branch Offices in Chicago • Cleveland • Dayton • Detroit  
 Indianapolis • Lansing • New York



**PRECISION INTERNAL AND  
 SURFACE GRINDERS**

**PRECISION BORE-MATIC  
 FINISHING MACHINES**

## **Heald Model 181 Centerless Internal doubles production of small bearing races**

This job was formerly done on a chuck-type machine. But costs were high — production unable to keep up with increased demand. Now, with a new Heald Model 181 Centerless, the races are ground two at a time in a special centerless roll unit — twice as fast as before.

Because of the small bore size, a hand loading arrangement with loading plug is used. Hi-Frequency wheelhead equipment keeps surface feet per minute at proper speed. Automatic sizing is controlled by the Gage-Matic method.

For the more usual range of work, the Model 181 is fully automatic in every element of the grinding cycle, including loading and unloading.

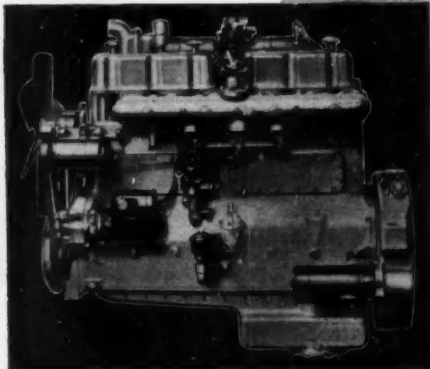
# WAUKESHA powers the pumpers!

## OREN



### WAUKESHA 145-GKB HIGH OUTPUT FIRE ENGINE SPECIAL

Six cylinders, 5¼-in. bore x 6-in. stroke,  
779 cu. in. displ., 240 hp. at 2400 rpm.



● "The South's Only Fire Truck Manufacturer"—Oren Roanoke Corp. of Roanoke, Virginia—builds in protection and performance *with power*. Waukesha power!

This powerful pumper—an Oren Model 1600/1000—is now an important part of the fire fighting facilities of Ludlow, Mass. It's a custom-built, triple combination, 1000 gpm. @ 150 lb. pumper—completely modern from its Hale Midship Mounted Centrifugal Pumps to its Waukesha 145-GKB High Output Fire Engine Special power plant developing 240 hp. at 2400 rpm.

It's a six-cylinder, valve-in-head type engine with every wanted feature for fire engines—fully counter-balanced 3¼-inch 7-bearing crankshaft • twin ignition • torsional vibration dampner • down draft carburetion • crankcase ventilation • overhead valves with Stellite seats • removable wet sleeve cylinders • aluminum pistons. And it's arranged for full electrical equipment and all modern accessories.

*Send for Bulletin 1402.*

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS., NEW YORK, TULSA, LOS ANGELES

# WAUKESHA ENGINES

# INCONEL EXHAUST PIPE GOES 260,677 MILES

**...and still no sign of wear out!**

**With Inconel exhaust pipes on 45 trucks  
Carolina Freight Carriers Corp. reports big  
savings in maintenance and replacement costs.**



*"This Inconel® exhaust pipe has lasted 260,677 miles and it looks as good as though it had been installed last week. I believe it will last another 200,000 miles... and maybe more."*

The enthusiastic words are from Mr. Thomas R. Harmon, Superintendent of Maintenance for the Carolina Freight Carriers Corp. of Cherryville, N. C. This concern operates 99 tractors, 18 pick-up trucks, and 143 large trailers.

Forty-five of the fleets' heaviest trucks are equipped with Inconel exhaust pipes. *And not a single on-the-road delay has ever been caused by an Inconel pipe.*

Carolina Freight Carriers Corp. is installing Inconel exhaust pipes throughout its fleet. Mr. Harmon states that Inconel exhaust pipes replace the originally-supplied steel pipes as the steel pipes burn out... usually within 25,000 to 40,000 miles.

The "fight back" qualities of Inconel...remarkable

hot strength, high resistance to corrosion...make it a money-saving metal for other automotive trouble spots, too. Inconel has long been widely used for choke tubes. In severe road tests, Inconel bus and truck muffler interiors have given thousands of extra miles of service. And Inconel heater combustion chambers give several times the service life of less durable metals formerly used.

If you are a fleet operator or automotive manufacturer, you will want to know more about the amazing money-saving potentialities of Inconel and other Inconel alloys. Write for full engineering information and sources of supply today.

Our Technical Service Department always welcomes an opportunity to help you solve your metal-selection and fabrication problems.

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 Wall Street, New York 5, N. Y.

\*Reg. U. S. Pat. Off.

Exhaust pipes usually fail first at the muffler junction. This Inconel exhaust pipe, removed for photographing after 196,035 miles of service, showed no signs of wear.



**INCONEL\***...for long life at high temperatures

AUTOMOTIVE INDUSTRIES, February 15, 1959

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AUTOMOTIVE INDUSTRIES, February 15, 1950

# TOUREK

BALL JOINTS, PIPE PLUGS  
AND QUALITY  
SCREW MACHINE PRODUCTS

## BALL JOINTS



Tourek's quality Ball Joints meet exacting requirements. Simplified design, improved performance, and lower costs result from specifying Tourek Ball Joints... the only recognized standard. Large stocks assure prompt delivery.

## PIPE PLUGS



Tourek's precision countersunk steel pipe plugs are accurate, high strength, and economical—resulting in the highest quality at costs which are competitive to old style plugs.

Stock sizes, available with National Pipe or Dry-Seal threads are: 1/4", 3/8", 1/2", 3/4" and 1". Also available on special order in alloy steels, aluminum or brass in sizes up to 2 1/2" diameter.

## SCREW MACHINE PRODUCTS



Modern high-speed single and 6-spindle automatics—together with complete secondary equipment, including grinding and brazing—plus 30 years' experience, assure you "The Best in Quality Screw Machine Products."

Your requirements, up to 2 1/2", are made with utmost precision, and with promptest delivery assurances.

LITERATURE—Comprehensive data on any or all Tourek products sent promptly upon request. Write for yours now. J. J. TOUREK MFG. CO., 4701 West 16th St., Chicago 50, Illinois.



# TOUREK

"THE BEST IN QUALITY SCREW MACHINE PRODUCTS"



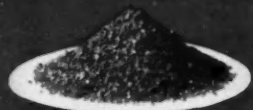
ESTABLISHED IN 1920



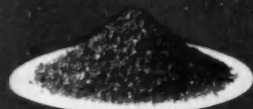
## Abrasive Grains Uniform...for consistent performance

Fused crystalline aluminum oxide abrasive in all standard grain sizes, or run-of-the-mill sizes. Uniformly hard, sharp, tough. Uniformly sized—as indicated by the shadows cast by the grains pictured above.

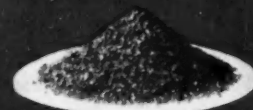
Tradenamed Borolon, Borablast, Borogrit and Sans-Slip, and produced under complete Simonds control, Borolon grain is scientifically treated to remove impurities. Let's send you inspection samples and prices. Write, specifying required grain size and intended use.



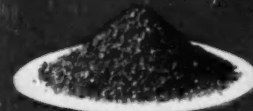
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**TUMBLING**



**BLASTING**



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Experimental testing in the  
Dynamometer Section

Designing machine tools needed for  
volume production of piston rings

**SOME OF THE RESOURCES  
BEHIND A**

***Unique Policy***

Visual inspection  
of piston rings

Checking piston ring  
profile on optical comparator

Inspection of tin coated rings  
in Plating department

X-ray examination of  
piston ring castings

Packaging of factory-  
engineered service sets

Planning department studying  
materials flow on scale model

***Policy***

"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."

**MUSKEGON**  
***Piston Rings***

**MUSKEGON PISTON RING CO.**  
MUSKEGON, MICHIGAN  
PLANTS AT MUSKEGON AND SPARTA

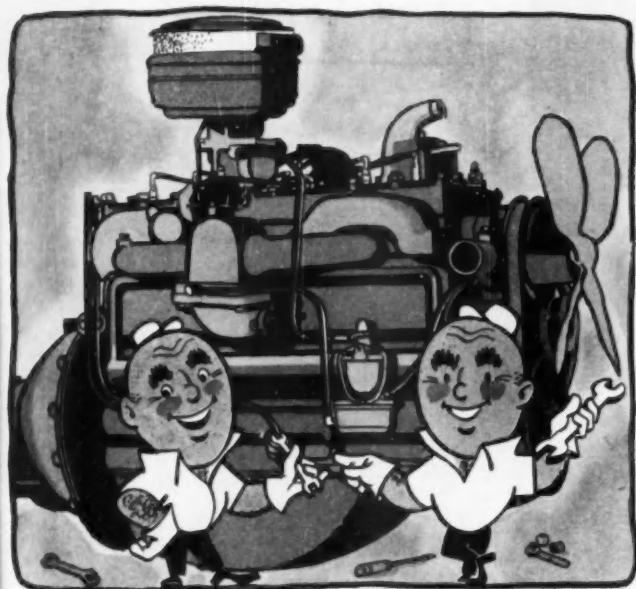
**"THE ENGINE BUILDERS' SOURCE"**

# What makes Bundyweld better automotive tubing?

It takes a whole list of remarkable features to answer that one.

But in a nutshell, Bundyweld adds up to better automotive tubing, *because it's double-walled from a single strip*. No other tubing can match it in your automotive applications because no other tubing is like it.

That's why Bundyweld is extra-sturdy, extra-strong. Rugged and highly resistant to vibration fatigue, it's in 95% of today's cars in an average of twenty different applications, including gas lines, oil lines and hydraulic brake line systems—a pressure-proof tubing perfect for the toughest of jobs.



That's why Bundyweld is safer, more leakproof, too. Copper-bonded at all points of its double-wall contact, it's perfect for hydraulic push-button systems . . . lasts through thousands of miles of jolts, stress and strain.



With all its sturdiness, Bundyweld is still lightweight, ductile. It's easy to handle, readily machined, cut and joined. It bends more easily and it takes more bending without weakening or collapsing structurally . . . points worth considering when you're shaving production costs.

## Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

Whatever your automotive tubing need, you'll find Bundyweld fills it *better*. For an assist on any question, just contact a listed distributor, or write: Bundy Tubing Company, Detroit 14, Michigan.

### WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of basic metal, coated with a bonding metal. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Bonding metal fuses with basic metal, presto—

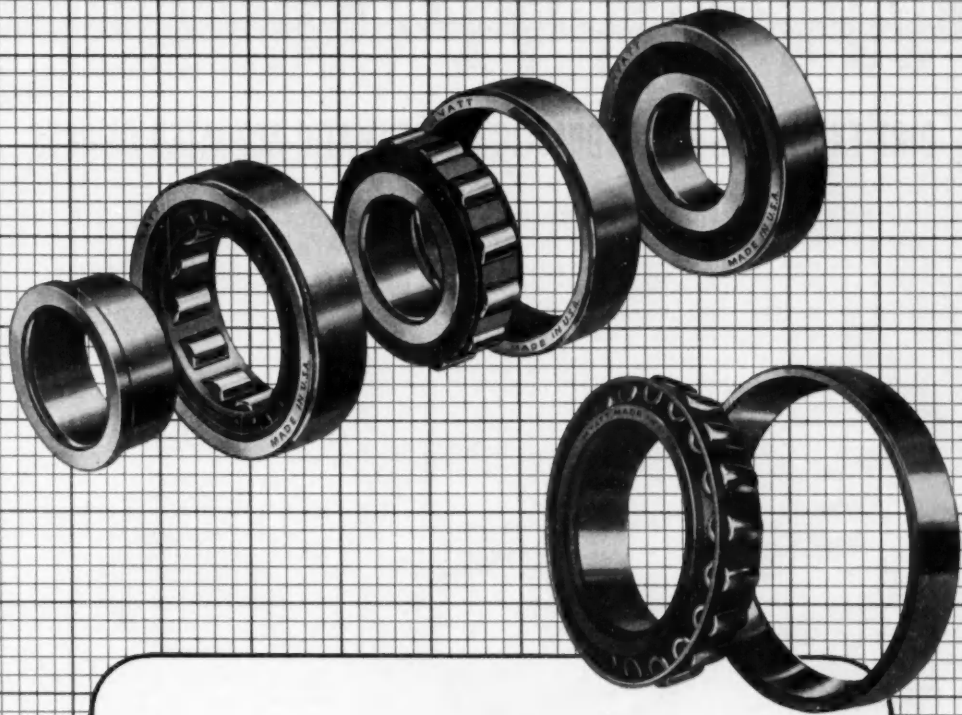


Bundyweld . . . double-walled and brazed through 360° of wall contact.



SIZES UP TO 1/2" O.D.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Pelton-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lapham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Philadelphia 3, Penn.: Rutan & Co., 404 Architects Bldg. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 3628 E. Marginal Way • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 881 Bay St. • Bundyweld Nickel and Monel Tubing is sold by distributors of Nickel and Nickel alloys in principal cities.



## Take Advantage of HYATT Experience

Hyatt Hy-Load bearings are high capacity cylindrical roller bearings. They are available in two diameter series, wide and narrow widths and standard AFBMA boundary dimensions.

There are ten major types; four with separable inner races, two with separable outer races and four which are non-separable.

This wide range of available sizes and types, plus complete interchangeability of parts permits wide flexibility of machine design and assembly procedures.

In applications where bearings are subjected to both radial and thrust

loads, particularly where conditions tending to misalignment are present, Hyatt offers the spherangular series of angular contact self-aligning bearings.

Over the years, more and more design engineers have come to rely upon Hyatt for completely dependable bearing engineering. If bearings are a part of the machine you are designing reach for your Hyatt catalog or make use of the Hyatt Engineering Service. For further information write to Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey and Detroit, Michigan.

# HYATT ROLLER BEARINGS

# NATIONAL OIL SEAL LOGBOOK

## DIRT EXCLUDERS FOR HYDRAULIC & PNEUMATIC ACTUATED DEVICES

Truck hoists and hydraulic lifts of all kinds usually must perform under extreme operating and surrounding conditions. Piston shafts sometimes become caked with heavy abrasives; fine dust, muck and dirt are common. Shafts are many times subject to angular thrusts which cause considerable movement off center (Fig. 1). These conditions can result in the entry of copious quantities of extraneous matter into the cylinder causing excessive wear or failure of pressure seals whether of "O" ring or packing gland type.

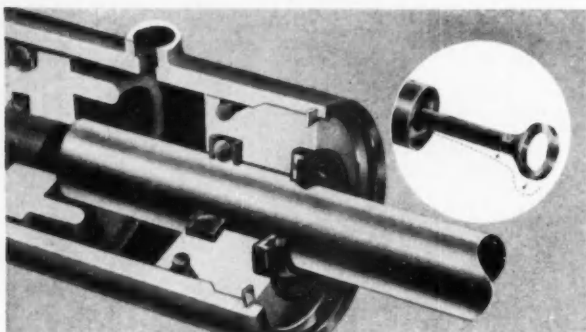


Fig. 1. Typical section of hydraulic actuated mechanism showing use of National Seal as dust excluder—note "O" rings and back-up rings.

Rugged, yet flexible, Syntech\* oil seals of the type illustrated (Fig. 2) provide excellent protection for such equipment. These seals act as a wiper on the reciprocating shaft to clear away extraneous abrasive matter. Where ice or heavy caking of dirt is encountered a combination of bronze ring scraper and a Syntech\* seal (Fig. 3) can be employed—the bronze scraper to break up and remove the heavy cake and the oil seal to clean the shaft.

These National Syntech\* Seals have been extremely successful in appli-

cations of this kind where leather type seals and other devices have failed. The Syntech\* rubber is flexible enough to follow the shaft eccentricities, yet sturdy enough to keep from buckling under as the shaft moves back and forth, even under extreme shaft eccentricities.

National Syntech\* Seals in combination with "O" rings provide a close approach to the ideal for hydraulic or pneumatic actuators of all types and sizes. However, leather or other sealing member materials are supplied in a few special appli-



Fig. 2. National 340,000 Series springless type seal. A good design for use in hydraulic or pneumatic actuators.

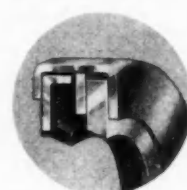


Fig. 3. Combination National Syntech\* Seal with bronze scraper ring.

cations. National can also supply "O" rings and back up rings as shown (Fig. 1) to meet the most rigid specifications in a complete range of sizes. Your inquiry will receive prompt attention.



**NATIONAL MOTOR BEARING CO., INC.**

General Offices: Redwood City, Calif.  
Plants: Redwood City and Los Angeles,  
Calif.; Van Wert, Ohio

\* Trade Mark Registered

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# *Steering* AT ITS BEST



CITY COACH BY SOUTHERN COACH MANUFACTURING CO.

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FOR CITY SERVICE the Southern Coach Manufacturing Company of Evergreen, Alabama, has introduced its new Model F-41, distinguished in appearance and completely modern in every detail of equipment. It has forty-one passenger seating capacity and its good steering is supplied by Ross.

The Ross policy of incorporating advancements in design as they are proved by exhaustive tests has resulted in many recent improvements. Current Ross models have:

- (1) Increased mechanical reduction . . . (2) More compactness . . . (3) Reduction in weight . . . (4) Greater arm angular-travel . . . (5) Improved metallurgy . . . (6) Increased efficiency.

Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

**Ross**

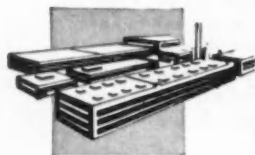
*Cam & Lever* **STEERING**

ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA



## WESTERN FELT:

*Your Insurance Against Complaints*



*Fiftieth  
Anniversary Year*

Felt is not "just felt." There is a vast difference in its manufacture and efficiency. Because Western Felt for over fifty years has not, and will not, depart from its policy of maintaining the highest possible quality in material and manufacture, its products, wherever they may be employed, are your insurance against product complaints due to a Western Felt component part.

Here are just a few of its features that you can always depend on: range from wool softness to rock hardness—never loses shape—does not ravel or fray—resists oil, water, heat, age, resilient, flexible, compressible—may be cut to extremely close tolerances for small parts—unsurpassed in uniformity.

Western Felt engineers with decades of experience in the use of felt stand ready to counsel you.



# WESTERN FELT WORKS

4035-4117 Ogden Ave., Chicago 23, Illinois

*Branches in all Principal Cities*

Largest Independent Manufacturers and Cutters of wool, hair and jute felts

100 F

# the Doctor of Motors



# Rumor Page



## IT'S RUMORED THAT

Three million of America's drivers have visual defects!

UNFORTUNATELY TRUE! This estimate by the American Association of Motor Vehicle Administrators is supported by accident statistics. (Too many baseball umpires with licenses?)

Contributed by J. C. Salak, 6415 S. Kimbark Ave., Chicago

## IT'S RUMORED THAT

Windshield glass may soon be electrified!



KEE-RECT! A new windshield glass with a transparent film of oxide 20 millionths of an inch thick has been announced. The oxide will carry an electric current to eliminate fogging and icing.

## IT'S RUMORED THAT

PC's Sectional Steel Oil Ring is the best "Oil Stopper" made

COULDN'T BE RIGHTER! Oil Rings have a mighty tough job to do in worn engines—because, actually, they must do two jobs—permit adequate lubrication of upper rings and cylinder walls, yet stop excessive oil consumption.

Millions of installations prove that PC's GX "Oil Stopper" eliminates oil pumping, increases power, saves gas and oil, and gives longer life to worn engines! No wonder it's preferred by motorists and Doctors of Motors everywhere! It's designed for the severest duty!

Let the "Oil Stopper" be your trouble shooter on all worn engine jobs. Ask for it in the Perfect Circle 500-5000 Series.



## IT'S RUMORED THAT

Sound waves may scramble eggs, churn butter and homogenize milk!

IT'S A FACT! A new research device, producing sound waves far above the range of human hearing, can do all this and more! Its inaudible sounds can shatter glass, mix paint, and turn water into fog!

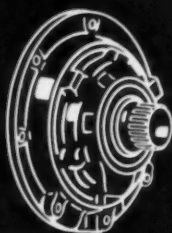
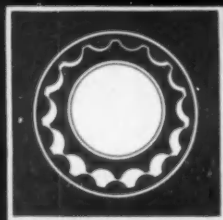


# Perfect Circle

*The Most Honored Name in Piston Rings*

# EATON ROTOR PUMPS

*for Hydraulic Transmissions  
Provide Silent Operation,  
High Efficiency*



FRONT



REAR

Specialized Facilities  
for the Large Scale Production  
of Around-the-Shaft Transmission Pumps



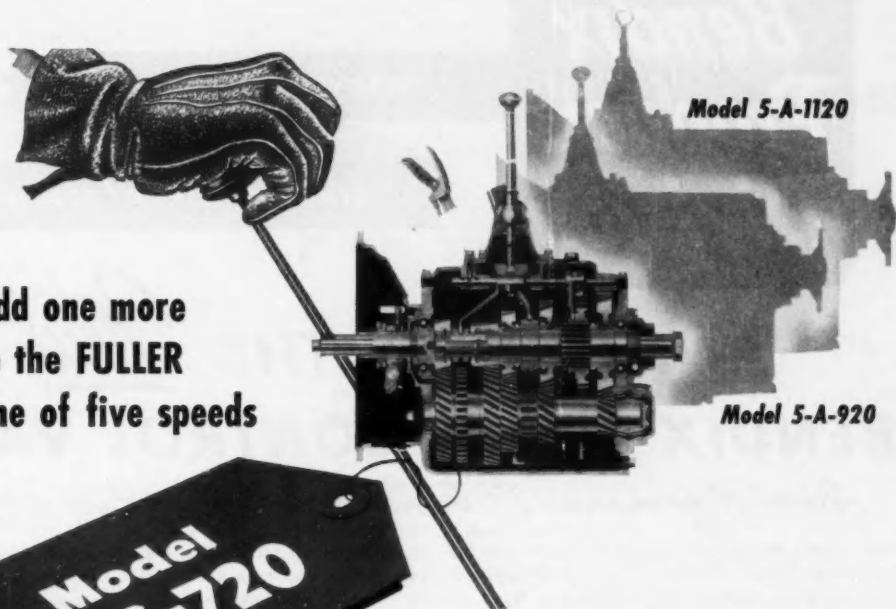
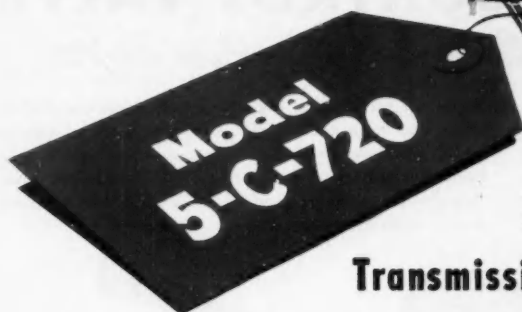
EATON MANUFACTURING COMPANY

GENERAL OFFICES: CLEVELAND, OHIO

*Pump Division*

9771 FRENCH ROAD • DETROIT 13, MICHIGAN

Add one more  
to the FULLER  
line of five speeds



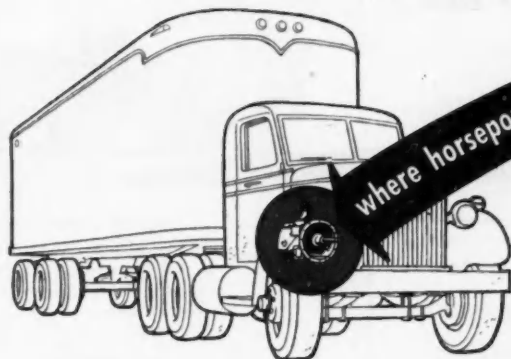
## Here is a NEW FULLER Transmission...the Model 5-C-720

Third of the all-helical geared five-speed Fuller Transmissions, Model 5-C-720 completes the line of heavy-duty units designed to cover a range of engines developing 150 to 300 hp.

**All-helical gearing permits compact design, and:**

- Shorter, easier shifts
- Quiet operation
- Longer life
- Low weight—high capacity

Write now for engineering details.



where horsepower goes to work



**FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN**

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

# Bendix Products Division

CREATIVE ENGINEERING

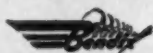
GEARED TO QUANTITY PRODUCTION

## ANNOUNCES THE *New* BENDIX HAND CONTROL VALVE *Finer Performance At A Lower Cost Than Ever Before!*

Here is the valve that gives truckers the ultimate in hand controls for vacuum braking systems—but costs even less than ordinary models. The new Bendix Hand Control Valve is a simple, rugged unit with a clean, modern appearance that adds to the good looks of any cab interior. Its absolute dependability and consistent pre-

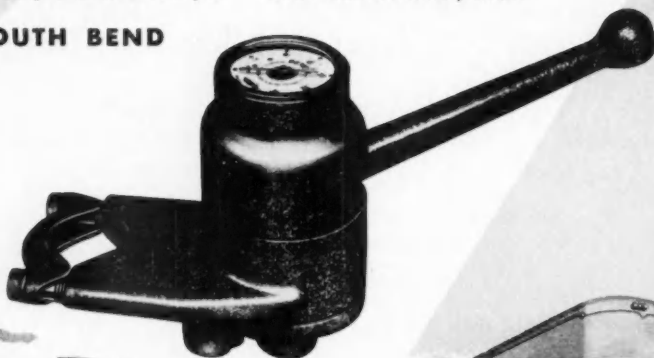
cision set an all time high for performance—and at a lower cost than ever before! Available with or without an integral, easy-to-read vacuum gauge, the new Bendix Hand Control Valve assures maximum flexibility with today's vacuum trailer braking assemblies. For complete details write the factory direct.

BENDIX • PRODUCTS DIVISION • SOUTH BEND



AVIATION CORPORATION

Export Sales: Bendix International Division,  
72 Fifth Avenue, New York 11, New York



### GRADUATES ACCURATELY



The new Bendix Hand Control Valve applies the brakes in amount exactly corresponding to where the handle is set—no more and no less—and the driver can depend on it.

### ACTS CONSISTENTLY



Graduated braking is always the same, in application and release each time the valve is used.

BUILDERS  
OF THE BASICS  
OF BETTER  
MOTOR VEHICLES

### HOLDS A SETTING



When the handle is left in a fixed position, there is no tendency for brakes to creep on or off—no "leakover" when the valve is seated.

### AND HERE'S WHY



This new hand control valve is a product of Bendix, greatest name in braking. Engineered and precision built, it delivers dependable performance under all operating conditions.

# AUTOMOTIVE INDUSTRIES

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**AUTOMOTIVE  
INDUSTRIES**

Reg. U. S. Pat. Off.

AUTOMOTIVE INDUSTRIES, February 15, 1950

## High Spots of This Issue

### ★ 1951 Kaiser-Frazer Series

A new small low-priced model is among outstanding news in K-F offerings for this year. The small car will be available in Standard and DeLuxe types with four or six cylinder engines. On newly designed Kaiser and Frazer cars Hydra-Matic or Overdrive is optional. And the K-F six cylinder engine has been improved, with horsepower increased to 115. Up-to-the-minute details start on page 30.

### ★ Heavy Duty Bearing Test Machine

Construction and operation of an interesting centrifugally loaded bearing tester for heavy duty aircraft engines is here amply described and illustrated. Located at the Allison Division General Motors Bearing Plant, the tester is product of 17 years' continual development and perfecting. Page 34.

### ★ Hot-Skinning Eliminates Oil-Canning of Thin Sheet Metal

This article discusses the technique of "hot-skinning" main landing flaps and elevons of B-35 type airplanes. The technique has been found to solve not only hazards of high air loads but also hazards of fire, the latter being peculiar to certain designs of control surfaces which place them in the path of hot exhaust gases from turbo superchargers. See page 40.

### ★ Trend in Europe to Torsion Bar Suspension—Part Two

Sequel to Part One appearing in February 1st Issue of AUTOMOTIVE INDUSTRIES, Part Two deals with torsion bar systems used in the Lagonda, Vauxhall, Panhard, Bristol, Chenard & Walcker, Mercedes, and Volkswagen in Europe. Turn to page 42.

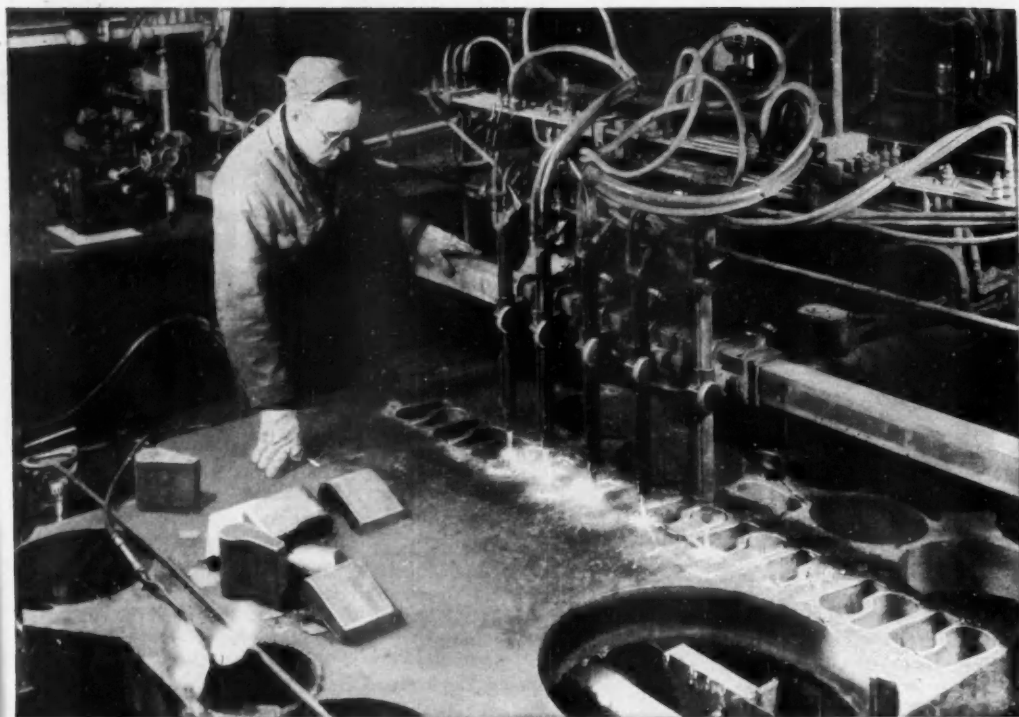
### ★ Aviation Tooling for Military Engines

At Continental Motors' large war-built plant the first air-cooled military engine to be placed in production is a 12 cylinder model. How Continental has tooled up to a point reminiscent of aircraft production during war years, using a goodly percentage of surplus government machinery suitably rebuilt, makes an interesting story, beginning page 50.

### ★ 24 New Product Items And Other High Spots, Such As:

British experimental underdrive and overdrive units; the new Ferrari engine; the Peugeot Model 203 engine; the new British racer with a super speed engine; and how Renault has doubled output with ECA aid.

*News of the Automotive Industries, Page 17  
For Complete Table of Contents, See Page 3*



The metal box, upper left behind operator, contains electronic tracing device which follows sketch and guides cutting torch.

## New Electric Eye Machines Speed Ryerson Cutting Service

The multiple-torch gas cutting machine shown above is one of eleven recently installed in Ryerson plants from coast to coast. Equipped with an electronic eye tracing device, these remarkable new machines cut the most intricate shapes swiftly, accurately. Time spent in preparing wood and metal template making is eliminated. Instead the electric eye follows a simple sketch or blueprint within plus or minus fifteen-thousandths of an inch!

Many manufacturers are saving time and effecting substantial economies through the use of Ryerson flame-cutting. With electric eye machines rounding out a complete flame-cutting service, your Ryerson plant produces an endless variety of shapes from strong rolled steel. To mention only a few—circles, rings, wrenches, flanges, crankshafts, weldment parts, cams—many more. The result: clean, accurate edges whether mild steel, high carbon, alloy or stainless

steel is used. And your Ryerson plant can produce hundreds of pieces to the same pattern with almost die-cut uniformity, from steel plate up to 15-in. thick.

The new Ryerson cutting machines illustrate how we are continually expanding our facilities to give you faster, more efficient steel service. The exact steel you need, cut or otherwise prepared to your particular specifications is delivered promptly when you draw on large, diversified Ryerson stocks.

### PRINCIPAL PRODUCTS

<b>BAR</b> —Carbon & alloy, hot rolled & cold finished.	<b>STAINLESS</b> —Allegheny bars, tubing, plates, sheets, etc.
<b>SHAFTING</b> —Cold fin, ground & polished, etc.	<b>PLATES</b> —Sheared & U. M., Inland 4-Way Floor Plate.
<b>STRUCTURALS</b> —Channels, angles, beams, etc.	<b>SHEETS</b> —Hot & cold rolled, many types.
<b>TUBING</b> —Seamless & welded mechanical & boiler tubes.	<b>MACHINERY &amp; TOOLS—METAL WORKING EQUIPMENT</b>

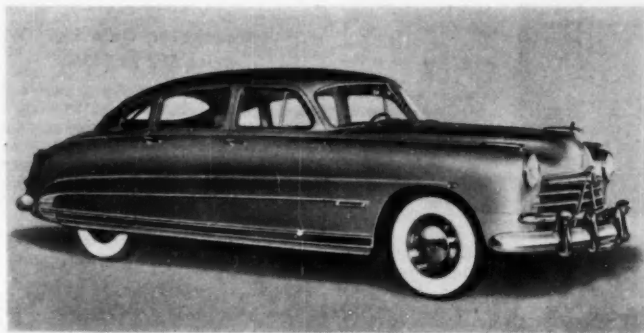
# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI  
CLEVELAND • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

# News of the AUTOMOTIVE INDUSTRIES

Vol. 102, No. 4

February 15, 1950



## CHOOSE YOUR HEAD

With a wheelbase of 124 in., the new Hudson Commodore Custom and Super lines are available with a choice of 123-hp six cyl or 128-hp eight cyl engines. Five feet high, the new Commodore Custom Eight sedan is shown above. Both engines have a compression ratio of 6.7 to 1 with a standard cast-iron head, and a ratio of 7.2 to 1 with an optional aluminum head.

## Chrysler Strike Dooms 1st Quarter Car Goal

The Chrysler strike has apparently doomed plans of the industry to build nearly two million vehicles during the first quarter of this year. Even with Ford and GM hitting record breaking schedules during the rest of February and through March, and independents also pushing along at a high rate, the loss of Chrysler production will make the goal unattainable. Although the strike might be settled by the third week in February, which did not seem likely at press time, the loss of production would be too great to make up. Nonetheless, production will still be very high by any previous standards with the forecast for February indicating about 500,000 units, approximately 145,000 short of earlier schedules.

## Hudson Cuts Prices on 1950 Models

Hudson is the second passenger car builder to cut prices so far this year. Reductions on the 1950 Super and Custom Commodore series announced Feb. 10 range from \$87.50 to \$166.50 on a list price basis. A. E. Barit, Hudson president, said that the price cuts are due to lower production costs brought

about by increased production efficiency. New prices are as follows:

Super Six		Reduction
Brougham	\$1925.00	\$ 87.50
Club Coupe	1957.00	100.50
Four-door Sedan	1969.00	100.50
Convertible Brougham	2456.00	166.50
Super Eight		
Brougham	2005.00	87.50
Club Coupe	2037.00	100.50
Four-door Sedan	2040.00	100.50
Custom Commodore Six		
Club Coupe	2165.00	100.00
Four-door Sedan	2178.00	100.00
Convertible Brougham	2628.00	140.00
Custom Commodore Eight		
Club Coupe	2185.00	100.00
Four-door Sedan	2208.00	100.00
Convertible Brougham	2708.00	140.00

## Willys Reported Planning Small Low-Priced Car

Reliable information indicates that Willys may be back into the conventional passenger car business either late this year or early in 1951. The company has had a small car under development for several years and during the SAE Convention in January, D. G. (Barney) Roos, first vice-president, was observed driving around Detroit in a small automobile. Also, the appointment of Lyman Slack, formerly Packard sales chief, who has had long experience in passenger car sales, may be more than a coincidence. The small car picture will be interesting a year from now if Willys gets into production

on such a vehicle by then. Nash will get into the field in April with a 103-in. wheelbase model, followed by Kaiser-Frazer with its 100-in. wheelbase car in June. An interesting point regarding these two cars is that Nash will not concentrate on low price as much as on a quality smaller automobile featuring excellent fuel economy, whereas K-F's line of attack will be an initially lower price for a stripped-down, smaller car on which all frills have been eliminated as standard equipment and also offering excellent fuel economy.

What Willys has in mind is still uncertain, but if the company is sticking to its traditional policy, the car would be a small stripped-down model with very plain appointments and featuring fuel economy, making it a direct competitor with the K-F low priced model. That would be interesting in another respect since both cars would use basically the same engines, although with some possible differences in certain specifications. Such a move, of course, would result in substantial savings to both companies so far as engine production costs are concerned since tooling and overhead costs could be shared.

## Tucker Acquitted of Fraud Now Faces Civil Suits

Although Preston Tucker, president of the defunct Tucker Corp., and seven associates were acquitted in Federal Court in Chicago of fraud and mail conspiracy charges, he is still threatened with a flood of civil actions. Trustees appointed by the court have indicated that they will start action against the Tucker president to recover funds from him to meet claims of stockholders, dealers and other creditors. Federal court in Chicago has extended an order, first issued last August, prohibiting Mr. Tucker from disposing of any of his personal property.

## GM Approves Houghton Oil for Automatic Transmissions

The E. F. Houghton & Co., Philadelphia, Pa., has received approval of its transmission fluid, type A, by the General Motors Corp., for use in the automatic transmission and torque converter-fluid coupling systems of GM automobiles.

# News of the AUTOMOTIVE



## LIMITS LARCENY

To make rear compartments as theft proof as is practical, GM's Fisher Body engineers are shown testing the strength of a new compartment lid by using a series of jacks and gages. The jack at the right above is pushing up on the lid, the one in the middle is stationary, and the one at the left pushes down while gages measure deflection.

## K-F to Keep Frazer Name in Car Line

Kaiser-Frazer has stated definitely that it will not drop the Frazer name from its line and make orphans of more than 100,000 Frazers already in the hands of customers. For the first time the Kaiser and Frazer cars are basically and entirely different automobiles with the Frazer maintaining many of its original mechanical specifications, whereas the Kaiser is completely revamped. Where formerly identical body panels were used to build the two cars, they are now entirely dissimilar. There is a possibility that the Frazer line as now constituted might be dropped and one of the more luxurious models of the Kaiser line given the Frazer name.

Haberstump-Harris Co.; I. Louis Carron, Carron Co.; Harold Atnip, Chrysler Corp.; Carl W. Cenzler, Hudson Motor Car Co.; William K. Norwick, Fisher Body, and Stanley C. Vanhey, Budd Co.

## Crosley Announces 1950 Models

Four passenger cars and two trucks comprise the recently announced 1950 line of Crosley cars. The units have an overall length of 145 in., wheelbase of 80 in., height of 57 in., and are powered by a four-cyl., 26-hp engine.

## Body Engineers Elect Fill President

Lynn A. Fill, chief engineer of Motor Products Corp., has been elected president of the American Society of Body Engineers. Other new officials include Charles L. Waterhouse, manager of styling for Ford, vice-president; James L. Berridge, design engineer for Woodall Industries, secretary; and Edward L. Pangborn, design engineer for Chrysler Corp., treasurer. Trustees are: Arthur L. Bradley, Wettlaufer Mfg. Co.; Alfred H. Haberstump,



## MAJOR AND LARGEST

This is the first view of the completed Chevrolet plant at Cleveland, O. Disclosed as the major source of the new Powerglide automatic transmission all parts will be brought here from Flint and other Chevrolet manufacturing plants for final machining and assembly. The Cleveland unit, containing roughly 1 million sq ft, is the largest Chevrolet plant under a single roof. It will also supply sheet metal parts.

## Reo Gets \$2 Million Loan from RFC

A loan to Reo Motors Inc., of \$2 million for working capital over a 10-month period was recently approved by the Reconstruction Finance Corp. Other recent major loans approved included \$1.5 million to Firth Sterling Steel & Carbide Corp., makers of tool and special steels, and \$1.2 million to Kerotest Manufacturing Co., of Pittsburgh, manufacturers of valves.

## Kaiser-Frazer Names Wilson Vice President and Treasurer

The Kaiser-Frazer Corp. has announced the appointment of Webb Wil-

son as vice-president and treasurer. He had previously been a director of Fairchild Engine and Airplane Corp. between 1939 and 1949, and served as treasurer from 1942 to July of last year. He has had many years of experience in the financial field, and in his new position will be a member of the K-F finance committee.

## Studebaker Cuts List Price \$82 to \$135

Studebaker reduced list prices on its passenger cars by \$82 to \$135 early in February. The company was the only independent that did not reduce car prices last year. Factory delivered price at South Bend is reduced even more when the cut in Federal tax is included so that actually reductions to the customer range from \$86 to \$141. On that basis, prices now are:

Champion Deluxe		Reduction
Four-door	\$1597.25	\$ 91.25
Two-door	1565.50	91.25
Five-passenger coupe	1591.75	91.25
Three-passenger coupe	1497.00	91.25

Regal Deluxe		
Four-door	1676.00	96.00
Two-door	1644.50	96.00
Five-passenger coupe	1679.75	96.00
Three-passenger coupe	1576.00	88.00
Convertible	1981.25	105.00
Commander Deluxe		
Four-door	1902.50	116.75
Two-door	1871.00	116.75
Five-passenger coupe	1897.25	116.75
Regal Deluxe		
Four-door	2023.75	116.75
Two-door	1992.00	116.75
Five-passenger coupe	2018.25	116.75
Land Cruiser	2186.75	141.00
Convertible	2328	139.00

son, state and local taxes are extra. H. S. Vance, president and chairman of Studebaker, said that the price cuts are the result of lowered unit costs realized from the \$60 million modernization and expansion program started immediately after the war.

# INDUSTRIES

## Official Output for 1949 Shows 6,238,088 Units

Official factory sales figures compiled by the Automobile Manufacturers Association reveal that the automobile industry last year built a total of 6,238,088 cars, trucks, and buses. The breakdown shows 5,108,841 cars, an increase of 31 per cent over 1948, and 1,123,736 trucks, which represents a decline of 18 per cent from the previous year. Only 277,745 vehicles were exported last year, a drop of 36 per cent from 1948, and accounted for only four per cent of total production compared with eight per cent in 1948. Passenger car exports totaled 150,944 and trucks, 126,184.

## Nuffield Replaces TC MG with New Model TD

Aiming at dollar markets, the Nuffield Organization has replaced the M.G. model T.C. Midget by the Model T.D., a two-seater sports car with the original engine in a new chassis. New features are independent front wheel suspension and semi-elliptic springs at the rear; rack and pinion steering; right or left-hand drive; separate speedometer and revolution counter; body width increased by four in., and Lockheed brakes.

## Aircooled Motors Continues Operations

Aircooled Motors, Inc., manufacturing airplane and helicopter engines at its plant in Syracuse, N. Y., will continue in independent operation pending determination of the affairs of the Tucker Corp., Carl F. B. Roth, president, has said. Aircooled is a principal asset of the automobile corporation. The Aircooled president said that he expects added government business this summer and a pickup in the personal airplane engine business. The concern is reportedly the only one in the industry tooled for producing a line of engines designed specifically for helicopter use.

## Long Strike Predicted at Chrysler Corp.

First indications presage a long strike at Chrysler over conditions of a pension program. Actually, there is no question of Chrysler's willingness to grant a pension since the company offered a program very similar to that granted by Ford and even more liberal in some respects. However, the union turned down the offer and went on strike

because no stipulated amount per hour was earmarked for pensions and other benefits and no fund was to be set up in which the union would have a joint voice in administration. The union offered to settle for a flat 10-cents-an-hour wage increase, but the company rejected the proposal. The union's stand in the matter lends a great deal of weight to the charge made by Herman Weckler, Chrysler vice-president, that the "union leadership wants a 'kitty' that it can get its hands on." While making no definite commitment in cents per hour, Chrysler guaranteed pensions of \$100 per month to workers with 25 years seniority at age 65, with modified benefits to those with less than 25 and more than 15 years service. In addition, life, sickness and accident insurance would be increased at no cost to the workers. Entire cost of the program would be borne by the company and backed by the full faith and credit of the Chrysler Corp.

## Princeton Dedicates New Wind Tunnel

Making it possible to study supersonic flow at speeds from 1000 to 3500 mph and at altitudes ranging from sea level to some 20 miles above the earth's surface, a new supersonic wind tunnel was recently dedicated by Princeton University. Described as a Variable Density "Blow-Down" Supersonic Tunnel, the tunnel is basically an extension of the idea of using relatively low horsepower to compress air in a tank over a period of hours. Once the air has been compressed, it is allowed to discharge rapidly through a supersonic

nozzle, a process returning a rate of 50,000 hp for a short time interval. The tunnel, housed in a building adjoining the Guggenheim Jet Propulsion Center, is approximately 45 ft long, with the settling-chamber and working sections occupying some 20 ft, and the remaining footage constituting the diffusing section that exhausts the air to the atmosphere.

## Kurtis-Kraft Building Six Cars for Indianapolis Race

Kurtis-Kraft, Inc., is building six new cars on order for the 1950 Indianapolis speed classic. Five will be rear-drive cars and one a front-drive.

## Willys Develop New Type Cargo Personnel Carrier

Willys-Overland has developed a new special type four-wheel drive companion vehicle to the Jeep as an overseas field personnel and cargo carrier. It is powered by the Willys four-cyl engine and will be available in two models with 104½ in. wheelbase and 118 in. wheelbase. Carrying capacity is ¾-ton cargo load, or eight passengers and driver.

## Fruehauf Official Heads Truck-Trailer Builders

L. C. Allman, vice-president of Fruehauf Trailer Co., has been elected president of the Truck-Trailer Manufacturers Association. He has been active in the organization since it was formed more than 10 years ago.



British Information Services

## DRESS AS YOU GO

This new streamlined British fire engine is powered by Rolls Royce engines capable of developing 160 hp. The new fire engine carries a 50-ft ladder, two front searchlights, and features a cabin just behind the driver's cab for dressing on the way to the fire.

# News of the AUTOMOTIVE

## Checker Cab Co. Buys Transit Bus Builder

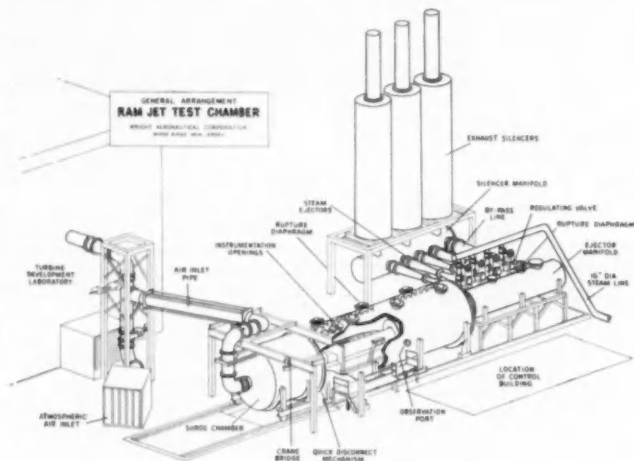
The Checker Cab Mfg. Co. has acquired Transit Buses, Inc. of Detroit and will operate it as a wholly-owned subsidiary. Transit Buses is a supplier of medium-sized coaches to transportation companies. Since May, 1947, Checker Cab has been supplying chassis on which Transit buses have been built. The Detroit personnel staff will be retained and expanded.

He joined Willys in 1939 and has served as research engineer, director of research, and equipment engineer. Prior to his association with Willys he was affiliated with Buick.

## 33rd Automobile Show Held in Belgium

Belgium recently held its 33rd automobile show with 65 makes in the passenger car section and in the commercial vehicle department 120 stands on

facturers of industrial bodies. Some of the former Belgium factories are now assembly plants for foreign makes; thus, Imperia is assembling the British Standard; Brossel is handling Leyland; A.E.C. is put on the market by Spitals; and Nash is being handled by Miesse. The opening of the show marked the inauguration of the Nash assembly line in the Miesse factory. Covering 86,000 sq ft, the assembly line handles six vehicles a day. GM, Ford, Studebaker and Chrysler have their own organizations or assembly plants in Belgium. New models were not expected at Brussels, and the only model apparently shown for the first time was the American Keller, with independent front suspension and Continental engine. Automobile imports into Belgium during 1949 will doubtless prove to be 22,402 units from the United States; 14,366 from France; 12,635 from England; 5295 from Germany; 1872 from Czechoslovakia; 1014 from Italy; and 90 from Sweden—for a total of 57,674 units.



## SIMULATES THE SUPERSONIC

The Wright Aeronautical Corp. is simulating flight speeds up to 2600 mph in this newly-opened jet engine laboratory in Wood-Ridge, N. J. Capable of simulating altitude conditions of 80,000 ft, the laboratory requires 22,000 kva at maximum output. Air from a gas turbine compressor in the turbine laboratory at the left is pumped to the ram jet test chamber, passing first through a surge chamber which reduces turbulence. The ram jet burner is mounted in the cutaway section shown above and is about 10 ft in length.

## Canadian Car Output Set Record in 1949

Aggregating 290,634 units, Canada's motor vehicle output set a new record in 1949, with the shipment of 192,458 passenger cars, 97,680 trucks, and 496 buses. The previous high was set in 1941 when 270,191 units were built, and 1949 production topped 1948's total of 264,178 by 10 per cent.

## Willys Appoints Stone Power Plant Engineer

Willys-Overland has named Donald S. Stone automotive power plant engi-

which 38 exhibitors represented 58 makes. Belgium has ceased to be an automobile manufacturing country, but this show is one of the biggest commercial fairs in Europe and the most international in character. Britain had a numerical lead in the passenger section, with 21 firms; U. S. A. had 20; France 10; Germany 6; Italy 4; Czechoslovakia 3; and Sweden 1. In the commercial vehicle section the U. S. A. had 16 different makes; England 14; France 13; Germany 6; Czechoslovakia 5; Belgium 3; and Italy, Holland and Switzerland one each.

If there was no purely Belgian automobile, there were 14 national manu-

## Gasoline Octane Numbers Increase

Octane numbers of regular and premium-price gasolines were one to two points higher last summer than during the two previous summers, according to the semi-annual survey of the Bureau of Mines. The average octane rating of regular gasoline tested last summer was 81.9, compared with 80.1 in 1948, and 80.2 in 1947. The average for premium gasolines was 88.0 last summer, compared with 86.1 and 85.9 in the two previous summers. Corresponding engine method numbers were 76.4, 75.2, and 75.1 for regular gasolines, and 80.4, 79.5 and 79.2 for premium gasolines. The 1949 summer averages are considerably higher than the ratings of wartime summer gasolines.

## GM Establishes Course in Industrial Health

GM has established a new type of postgraduate training program in industrial health techniques for younger doctors who have completed their internships. Doctors entering the program will be employed by GM for 12 months, eight of which will be spent in the medical departments of GM, with the remaining four months spent at the University of Michigan School of Public Health. The program is the first of its kind to be established in this country.

# INDUSTRIES

## French 1949 Car Output Up 44 Per Cent

With an increase of 44 per cent over the previous year, French automobile production for 1949 stands at 285,643 vehicles, of which 187,677 were passenger cars and 97,966 were trucks, buses and coaches. Agricultural tractors are not included in these figures. Renault was the biggest passenger car producer, with 63,920 four-passenger rear-engine automobiles. Numerically Citroen was second with 49,464 front-wheel drive models, including 896 of the cheap twin-cyl model. Peugeot produced 21,471 passenger cars; Simca's output (French Fiat) was 14,293, followed closely by Ford.

## Report Two More Valve-in-Head Engines on Way

Reports of new engines in the automobile industry continue to crop out. One is that Kaiser-Frazer is working on a new overhead valve power plant for eventual replacement of the current L-head in-line six. It is reliably reported that the engines are V-8's. Another is that Pontiac is lining up tooling for an overhead valve engine, which would probably be a V-8.

## Ford Picks Chase National As Pension Fund Trustee

The Ford Motor Co. has selected the Chase National Bank of New York as trustee for the company's pension fund for hourly-rated employees. The Guaranty Trust Co. of New York will be trustee for the fund set up for salaried personnel to provide pensions under a revised plan.

## AC Spark Plug Awarded Large Military Order

GM's AC Spark Plug Div. has been awarded \$30 million in new orders for bombing instruments and gun sights. The equipment will be built at the division's Milwaukee plant which now has sufficient orders on hand to assure capacity production well into 1951.

## Issue Performance Figures for De Havilland Comet

Provisional performance figures for the De Havilland Comet four-jet airliner have been issued in England after about six months of experimental flights. Two aircraft of this type should be delivered to the Canadian

MAKE	ELEVEN MONTHS									
	Units					Per Cent of Total				
	November 1948	October 1948	November 1949	1949	1948	1949	1948	1949	1948	1949
Chevrolet	27,487	29,307	23,064	318,352	279,417	36.05	28.85			
Ford	26,087	21,353	14,125	180,570	213,358	20.45	22.11			
Dodge	9,599	10,549	8,892	106,051	106,012	12.23	10.99			
International	6,832	6,274	7,884	64,959	118,256	9.82	12.26			
G. M. C.	6,029	7,149	6,794	74,996	68,909	6.49	7.15			
Studebaker	4,044	4,269	4,358	51,041	48,370	5.78	4.81			
Willys-Overland	1,041	1,126	2,384	17,295	25,373	1.86	2.63			
Willys-Jeep	915	877	2,662	13,408	46,243	1.82	4.79			
White	585	788	961	7,523	10,839	.85	1.13			
Black	619	707	546	6,147	9,205	.70	.95			
Diamond T	399	397	707	4,853	10,083	.54	1.04			
Reo	281	354	580	3,732	10,153	.42	1.06			
Diveco	233	350	319	3,339	5,367	.38	.96			
Autocar	120	124	254	1,483	2,560	.17	.27			
Brookway	151	169	270	1,450	2,781	.16	.29			
Federal	89	68	223	1,095	3,911	.12	.41			
Crosley	44	53	153	820	2,302	.09	.24			
Pontiac	148	90	49	562	420	.07	.04			
Kennedy	43	31	61	369	768	.04	.04			
F. W. D.	25	11	61	311	768	.03	.08			
Sterling	22	16	15	215	387	.02	.04			
All Others	175	206	333	2,627	3,006	.31	.31			
Total	79,699	86,398	75,024	683,181	964,692	100.00	100.00			

Pacific Airlines Ltd. in 1952-3 for the Vancouver Hong Kong service, and in addition 14 are on order for the British Overseas Airways Corp. In its present state of development the Comet has a cruising speed of 490 mph, a total weight of 105,000 lb, and a capacity payload (as a 36 seater) of 12,000 lb. With this maximum payload, its still air range is 3540 statute miles. The corresponding practical range is 2645 miles. By reducing the payload to 6000 lb, the practical range becomes 3000

miles. With no payload at all, it is 3220 miles.

## George K. Garrett Co. Starts Expansion Program

The George K. Garrett Co. has started a new expansion program to enlarge its production facilities. The first step in this program is a new one-story plant covering more than 50,000 sq ft of manufacturing space on a seven-acre plot in Elwood City, Pa.

MAKE	ELEVEN MONTHS									
	Units					Per Cent of Total				
	November 1948	October 1948	November 1949	1949	1948	1949	1948	1949	1948	1949
Chevrolet	90,677	102,796	80,820	957,399	850,456	21.64	20.46			
Ford	68,272	81,449	58,521	718,722	429,041	18.23	13.49			
Plymouth	47,466	51,081	35,832	478,158	313,932	10.81	9.87			
Buick	27,005	33,145	14,957	344,960	223,670	7.60	7.03			
Pontiac	27,171	30,044	19,224	293,768	209,317	6.54	6.58			
Dodge	27,509	30,564	19,155	250,163	182,710	5.65	6.06			
Oldsmobile	23,159	24,871	14,069	246,982	166,179	5.58	6.23			
Studebaker	17,694	21,133	11,633	182,394	131,901	4.12	4.15			
Mercury	17,317	19,546	7,962	165,638	125,625	3.74	3.96			
Hudson	7,059	7,911	9,912	125,569	97,916	2.64	3.08			
Nash	11,781	11,774	7,452	125,572	96,613	2.84	3.04			
Chrysler	11,515	13,492	9,341	119,746	95,528	2.71	3.00			
De Soto	9,467	10,090	7,962	95,119	74,606	2.15	2.35			
Packard	6,931	7,621	6,758	81,071	67,916	2.06	2.21			
Cadillac	6,376	13,492	3,757	74,374	54,298	1.66	1.71			
Kaiser	2,788	3,353	6,411	64,679	103,222	1.24	3.28			
Lincoln	2,636	3,243	3,427	35,004	26,310	.79	.89			
Willys	1,962	2,320	2,070	26,684	19,444	.60	.81			
Frazer	463	567	3,831	15,305	54,962	.35	1.72			
Crosley	615	642	1,331	9,630	24,326	.22	.76			
British Ford	83	180	392	4,976	2,719	.11	.09			
Austin	432	471	474	3,199	9,314	.07	.23			
All Others	334	402	638	4,737	6,835	.11	.21			
Total	429,792	485,765	313,230	4,423,763	3,179,533	100.00	100.00			

# News of the AUTOMOTIVE

## Ford Appoints Raviolo Engine Assistant

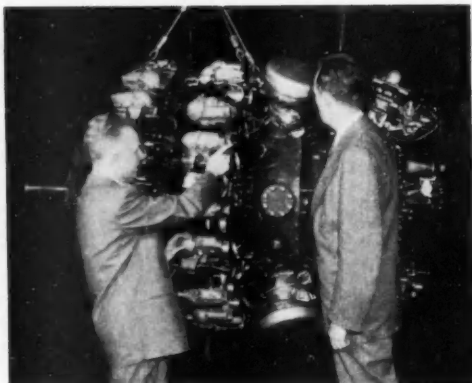
Victor G. Raviolo has been appointed engine engineering assistant to Earle S. MacPherson chief engineer of the Ford Motor Co. He had previously been head of the engine section of the engineering research department and has had 18 years experience in automotive engineering. He was assistant on design of the Ford tank engine in 1939 to 1943 and prior to that had experience with Packard and Chrysler.

## Kahn Associates to Build New Cleveland Ford Plant

The Ford Motor Co. has awarded a contract for building its new engine and foundry plant at Cleveland to Albert Kahn Associates of Detroit. The contract also calls for building a power plant. The company did not reveal the cost of the proposed buildings, but it is known that it runs into tens of millions of dollars. Ford has bought a 200-acre plot adjacent to the Cleveland City Airport as a site for the new plant.

## New XS-3 To Have Speed of 2200 mph

A new supersonic plane designed for speeds of about 2200 mph and a ceiling of 200,000 to 300,000 ft was disclosed by the Air Materiel Command to be under construction at Douglas' plant at Santa Monica, Calif. The plane, designated the X-3, will feature a pilot ejection seat through the floor of the plane to eliminate the hazard of hitting the ship's tail surfaces.



## FIRST IN THREE

Now in production in a little more than three years since it was first designed, the Wright Turbo-Cyclone 18 compound engine is shown here. With the first production engine are W. G. Lundquist, chief engineer, and T. B. Focke, vice president and general manager of Wright Aeronautical.

## L. W. Slack Joins Willys as Vice President

Lyman W. Slack, who quit as general sales manager of Packard more than two years ago to open a Lincoln-Mercury dealership at Portland, Ore., has returned to the automobile industry. He has joined Willys-Overland as vice-president in charge of distribution. Before joining Packard about 14 years ago, he was sales promotion manager of Pontiac.

Cub 95 and 105, and three are improved versions of the Clipper, now designated as the Piper Pacer, 115, 125, and 135.

## AMA Asks End of Excises on Automotive Products

The Automobile Manufacturers Association has called on Congress to repeal early and completely the excise taxes on automotive products. AMA is seeking a hearing to present its case, according to William J. Cronin, managing director. He points out that automotive excise taxes were first imposed in 1917 as a wartime measure, partially repealed in 1926 and completely removed in 1928, and then reimposed in 1932 as a temporary emergency revenue measure. They were never repealed, however, and were increased in 1940 and then doubled in 1941 partially to help finance war costs, but more importantly to discourage wartime use of motor vehicles.

## Piper Announces Five New 1950 Models

The Piper Aircraft Corp., Lock Haven, Pa., has announced five new 1950 models of Piper Aircraft. Two models are new versions of the trainer and general utility plane, the Super



## POST OFFICES IN PRODUCTION

Twin Coach Co., Kent, O., is running 10 special highway post office units through its production lines under a \$310,000 government order. These are the extra-long, 45-ft coaches, designed for use in rural areas not covered adequately by rail transportation.

## Mercury Sales in 1949 Best in History

The sale of Mercury cars last year totaled 190,335 units, the best year in history, according to J. E. Bayne, Lincoln-Mercury Div. sales manager. Sales last year were 36 per cent higher than in 1948. Production schedules have been pushed up sharply as a result of increased demand, with February projections 12 per cent higher than original estimates.

## Guaranteed Yearly Wage Next Union Goal

The next big objective by the UAW-CIO after pensions are won will be a

# INDUSTRIES

guaranteed annual wage, according to Walter P. Reuther, president. He told a meeting in Canada recently that the union will start its drive for the annual wage when the present goal of pensions and medical care is achieved.

## Bendix Expands Educational Program

The Bendix Products Div., Bendix Aviation Corp., reports that a permanent service sales school for automotive products has been established at South Bend, Ind. For many years it has been the company policy to supply educational facilities to specific groups brought to the factory from time to time, but now all previous programs have been expanded to carry specialized service sales and technical training to the mechanic in the field. Supplementing the permanent school at the factory are carefully planned traveling schools and vacuum power brake conferences that can be conducted anywhere.

## Unfilled Car Orders Nearly Eliminated

The automobile industry will go on a replacement basis, plus any new market due to population growth, by next July 1, according to Dr. R. S. Tucker, economist for GM. He said that the unfilled demand has been met for all but the lower priced cars and that this market will also be satisfied before the end of June.

## North American's New Contracts Total \$105 Million

New contracts totaling approximately \$105 million have been received by North American Aviation, Inc., since the close of its fiscal year last Sept. 30, the company has revealed. North American's backlog of unfilled orders was \$228 million at the end of the 1949 fiscal year, for which the company reported a net income of \$7,306,409 after taxes, compared to \$6,779,561, for the previous fiscal year.

## Nat'l Lead and Allegheny Ludlum Form Titanium Subsidiary

National Lead Co. and the Allegheny Ludlum Steel Corp. have announced the formation of Titanium Metals Corp. of America, a new jointly-owned organization which will market and distribute titanium metal, its alloys and various related products. The new company will make its headquarters in New York City.

## Name Brodie Vice President of Packard

George H. Brodie has been appointed vice-president in charge of coordinating operations for the Packard Motor Car Co. Since April, 1945, he had been assistant to the president and for the four previous years was manager of Packard's marine engine division. In his new position, he will be responsible for coordinating all engineering, manufacturing, sales, special project, and governmental programs.

## Hollingshead Forms a New Division

The R. M. Hollingshead Corp. has formed a separate new division to concentrate solely on used car reconditioning products. Heading the new Specialties Div. as director of sales is Robert R. Howard. The new Hollingshead sales division will function as a separate entity and will not be associated with the company's Whiz Automotive Div. in any way.

## Offer Automatic Transmissions On 12 Makes of Cars

Automatic transmissions of a variety of types are now offered either as standard or optional equipment on 12 makes of passenger cars, and are to be in production on Ford and Mercury cars later this year. A brief summary of all types is shown below. It may be noted that the Hydra-Matic transmission, pioneered by Oldsmobile, is currently supplied on the following makes:

Oldsmobile, Cadillac, Nash, and Lincoln, Chrysler Corp. cars — Chrysler, Dodge, and DeSoto—offer the Chrysler Fluid-Drive which uses the Chrysler-built fluid coupling in combination with a two-range, four-speed transmission. Hudson is continuing the use of its automatic drive which is a combination of a three-speed transmission, with automatic shifts from second to third, an automatic clutch, and overdrive. As shown below, the torque converter type of drive is now available on six different makes. Conjecture has it that Cadillac is working on the development of an automatic transmission combining the features of the Hydra-Matic and a torque converter.

	Torque Converter	Torque Mult.	No. Planets	Converter* Clutch
Packard Ultramatic	3-element	2.4	one compound	yes
Buick Dynaflo	5-element	3.25	one compound	no
Studebaker Borg-Warner	3-element	2.15	two epicyclic	yes
Chevrolet Powerglide	5-element	2.2	one compound	no
Ford Mercury Borg-Warner	3-element	2.9	one compound	no
Hydra-Matic	Fluid Coupling	—	two	no
Chrysler Corp.**	Fluid Coupling	—	none	no
Hudson**	—	—	—	no

\*Ford lock-out of the torque converter when in direct drive.

\*\*Have conventional clutch.

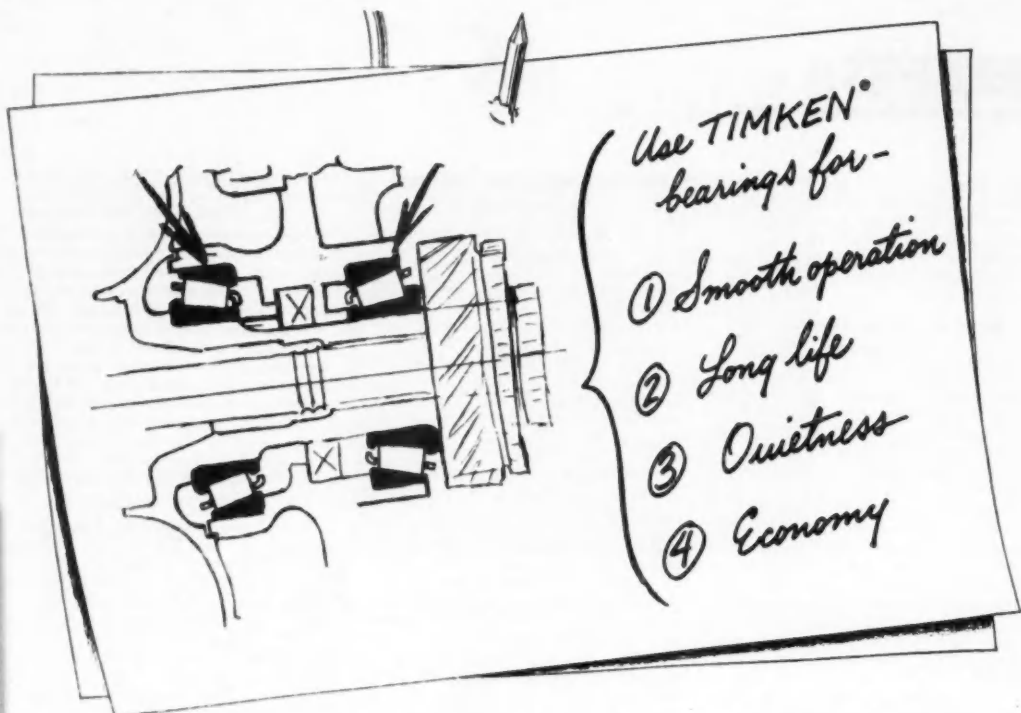
## ECA Provides \$4.5 Million to Ford of England

The Economic Cooperation Administration has agreed to provide \$4.5 million in Marshall Plan funds to the Ford Motor Co., Ltd., of England for a \$13.5 million retooling program which will permit production of two new types of passenger cars, a truck engine, and a heavy tractor. Under British policy, a major portion of output will go into the export market.



## BIG SISTER

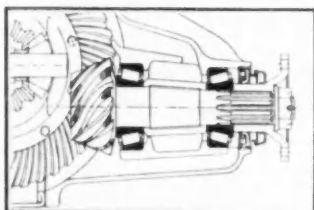
The USAF's new model Boeing C-97A, Stratofighter, a 74-ton, double-deck cargo and troop carrier, is powered by four 3500 hp Pratt and Whitney Wasp Major engines. It has an overall length of 110 ft. 4 in., and a wingspan of 141 ft. 3 in. This plane is a sistership of the Boeing YC-97B Stratocruiser.



## One idea gives four big advantages to your secret transmissions

**I**F you're working on designs for a secret new transmission, you can give it a big head start toward success with one simple step—specify Timken<sup>®</sup> tapered roller bearings.

Timken bearings offer four main advantages: (1) *Smooth operation*—the true rolling motion and remarkably smooth surfaces of Timken bearings cut friction to a minimum. (2) *Quietness*—Timken bearings hold shafts in rigid alignment under the heaviest loads, eliminate end-play, keep gears meshing smoothly. (3) *Long life*—Timken bearings reduce wear on adjacent parts, assure long-term precision movement, regardless of the power conversion system used. (4) *Economy*—The tapered design of Timken bearings takes radial, thrust and combination loads, makes separate thrust bearings or washers unnecessary, saves space, simplifies design.



All but two cars use Timken bearings on the pinion. Here's a typical application.

You'll find plenty of proof of these Timken bearing advantages in the automotive field. On pinions

—the industry's toughest bearing job—Timken bearings are used by all but two makes of cars! Wheels, steering parts and differentials are other typical applications.

For qualified engineering help with your bearing problems, just give us a call. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

**NOTE TO P. A.'s.** Because every step of the manufacture of Timken bearings is controlled within our company... because our vast manufacturing facilities are widely dispersed... you will find The Timken Roller Bearing Company a supply source of outstanding reliability.

**TIMKEN**  
TRADE MARK REG. U. S. PAT. OFF.  
**TAPERED ROLLER BEARINGS**



NOT JUST A BALL ○ NOT JUST A ROLLER □ THE TIMKEN TAPERED ROLLER □ BEARING TAKES RADIAL AND THRUST —●— LOADS OR ANY COMBINATION

# Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers.

Packard Motor Car Co.—The appointment of **George H. Brodie** to Vice-president in Charge of Coordinating Operations has been announced.

Ford Motor Co.—**Maynard T. Murray**

has been made Acting Plant Manager of Ford's Canton forge plant. Mr. Murray succeeds **Harry G. Howell** who has resigned. **Burton O. Heinrich** has been appointed to the position of Assistant Plant Manager.

Dodge Div., Chrysler Corp.—**D. A. Geil** has been named as Kansas City Regional Manager, serving parts of the states of Missouri, Kansas, Colorado, Oklahoma and New Mexico. He replaces **J. W. West**, who resigned. **Edward H. Rice** has been made Omaha Regional Manager, serving parts of the states of Nebraska, Kansas, Iowa, South Dakota and Wyoming. He succeeds **D. A. Geil**.

Chrysler Corp., Export Div.—**Philip K. Hills** has been made Sales Promotion Manager of the Export Division.

Hudson Motor Car Co.—The appointment of **Bruce E. Miller** as Manager of Local Area Advertising has been announced. Mr. Miller comes to Hudson after four years with the Packard Motor Car Co.

Lincoln-Mercury Div., Ford Motor Co.—Announcement has been made of the appointment of **William A. Keller** as National Used Car Manager for the Lincoln-Mercury Division. **Curtis R. Farrell** has been made Sales Representative for Lincoln-Mercury Division in the Metropolitan New York area.

Willys-Overland Motors, Inc.—**Donald D. Stone** has been named Automotive Power Plant Engineer.

Norton Co.—**Milton F. Beecher** has been elected Vice-President in Charge of Research and Development. **George N. Jeppson** was reelected as Board Chairman and **Milton P. Higgins** as company President. **Ralph F. Gow**, Executive Vice-President, Norton Co., was elected Vice-President of Norton Pike Co., and **Ralph M. Johnson**, Vice-President in Charge of Sales, Norton Co., was named to the Norton Pike Co. board.

Bendix Aviation Corp.—**George E. Stoll** and **C. S. Harding Mott** have been elected to the Board of Directors.

New Departure Division, General Motors Corp.—**John H. Baninger**, Assistant Chief Engineer of the New Departure Division, has retired.

General Electric Co.—Seven executives of the Apparatus Department have been named to new positions in the department's Large Apparatus Divisions. **C. W. Fuller**, transferred to the staff of the Manager of Manufacturing. **N. E.**

**Firestone**, appointed Staff Assistant to the Manager of Manufacturing. **K. O. Schulte**, appointed Manager of Wage Rate. **W. H. Bobear**, appointed Manager of Purchasing. **T. F. Garahan**, appointed Production Manager. **K. N. Bush**, appointed Assistant Production Manager. **A. V. Feigenbaum**, appointed Supervisor of Training, Manufacturing Personnel.

The Electric Storage Battery Co.—**Carl F. Norberg** has been elected Executive Vice-President of the company. **Leland E. Wells** has been appointed Exide's Chief Engineer.

Koppers Co., Inc.—**A. C. Thompson**, formerly Works Manager of Koppers' Bartlett Hayward plant, has been promoted to the position of Production Manager for the Company's Metal Products Division. **Nick Kay** has been made General Superintendent of the Division's machine shops, and **E. A. Franke** General Superintendent of the Division's foundries.

Sealed Power Corp.—**Martin W. Valuck** has been promoted to the position of Purchasing Agent to succeed **Roy S. Harvey**, who is retiring.

(Turn to page 86, please)

## Necrology

**Wilmer E. Moody**, 64, assistant factory manager, GM's GMC Truck & Coach Div., Pontiac, Mich., died on Jan. 23 at Birmingham, Mich.

**Charles H. Fox**, 89, president Ahrens-Fox Fire Engine Co., Cincinnati, and who is said to have designed the first motorized fire engine in this country, died on Jan. 26 in Cincinnati.

**William R. Angell**, 72, retired Detroit and Muskegon, Mich., industrialist, and former president of the Continental Motors Corp., died on Jan. 25 in Detroit.

**D. McCall White**, 69, veteran automobile engineer, a former vice president of the Cadillac division, former vice president and general manager of the Lafayette Auto Co.; special manufacturing advisor to the United Aircraft Corp., and a consulting engineer for the Tucker Car Corp., died in Hartford, Conn., on Jan. 29.

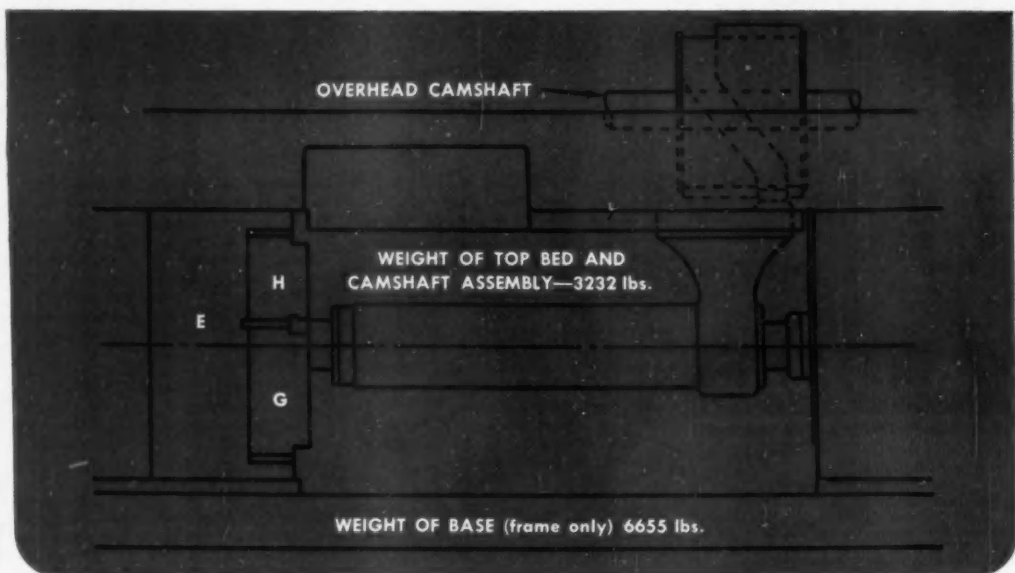
**Clifford P. Jensen**, 50, parts and accessories service manager, the White Motor Co., died Jan. 20 in Euclid, O.

## CALENDAR

### OF COMING SHOWS AND MEETINGS

#### Conventions and Meetings

Pacific Automotive Show, San Francisco	Feb. 16-19
Chicago Auto Show, Chicago	Feb. 18-26
A.S.T.M. Petroleum Products and Lubricants Mtg., Washington, D. C.	Feb. 20-24
A.S.T.M. Spring Mtg., Pittsburgh	Feb. 27-Mar. 3
A.S.T.M. Electrical Heating, Resistance, and Related Alloys Mtg., Phila.	Mar. 1-2
Amer. Road Builder's Assoc., Cincinnati	Mar. 6-9
SAE-ASTM Technical Committee, Automotive Rubber Mtg., Detroit	Mar. 8
SAE Passenger Car, Body & Production Mtg., Detroit	Mar. 14-16
Geneva Motor Show, Geneva, Switzerland	Mar. 16-26
Southwest Automotive Show, San Antonio, Texas	Mar. 23-26
A.S.T.M. Stress Analysis in Action Mtg., St. Louis	Mar. 28
NAI Production Expos., Chicago	Apr. 4-8
Amer. Inst. Elec. Engrs. Conf. on Elec. Welding, Detroit	Apr. 5-7
Midwest Power Conference, Chicago	Apr. 5-7
Amer. Society Lubrication Engineers Convention, Detroit	Apr. 10-11-12
Amer. Soc. Tool Engineers Industrial Expos., Phila.	Apr. 10-14
Society of Motor Mfrs. & Traders British Auto & Motorcycle Show, New York City	Apr. 15-23
SAE Aeronautic & Aircraft Eng. Display, New York City	Apr. 17-19
Metal Powder Assoc. Annual Metal Powder Show, Detroit	Apr. 25-26
3rd Highway Transportation Congress, Washington	Apr. 25-27
International Motor Show, Turin, Italy	May 7-11
Mid West Automotive Show, Chicago	May 11-14
Automotive Engine Rebuilders Assoc. Annual Convention, St. Louis	May 18-19
International Trade Fair, Toronto	May 23-June 9
Amer. Society for Quality Control Fifth Midwest Conference-Annual Convention, Milwaukee, Wis.	June 1-2
SAE Summer Mtg., French Lick	June 4-9
Amer. Electroplaters' Soc. Convention, Boston	June 12-16
A.S.T.M. Annual Mtg., Atlantic City	June 26-30
International Trade Fair, Chicago	Aug. 7-19
SAE Nat'l West Coast Mtg., Los Angeles	Aug. 14-16
SAE Tractor Mtg., Milwaukee	Sept. 11
Instrument Soc. of Amer. Conf. & Exhibit, Buffalo	Sept. 18-22
SAE Nat'l Transportation Mtg., New York City	Oct. 16-18



## PROFITS BEGIN WITH GOOD BUYING

Machine selection is often the difference between profit and loss, and the choice of one brand over another can be a vital decision. A machine that is not put to its best use is theoretically idle. A poor selection takes toll of all brands of the same type through greater

sales resistance and cost. The information prepared for better machine selection before the purchase should be as thorough and useful as that of the operation and maintenance hand books supplied after.

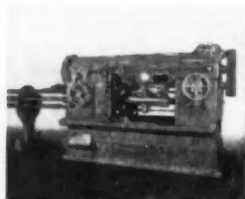
The information given above and below is useful in determining the facility of the 1½" Six Spindle CONOMATIC MAIN CROSS SLIDES:

1. They have never been equalled for dependable, low cost operation and maintenance in the handling of wide, heavy, form cuts.

The four, rectangular, box type, CROSS SLIDES, H and G, on front and rear sides of the machine, are nickel moly iron normalized. Their total weight is 296 lbs. They are held in axial position by retaining gibs against the finished wall surface of the machine frame support. They are held in parallel, radial position by their top and bottom flat bearing surfaces with tapered gib adjustment. The total area of their radial bearings, alone, is 444½ square inches.

2. They have a higher maximum load recommendation than do the cross slides of other "automatics."

The maximum load recommendation for each MAIN CROSS SLIDE is 3200 ft. lbs. The short (22" high) 11¾" by 44" Frame Support, E, weighs 802 lbs. net. It holds the slides between, and in close proximity to, nearly FIVE TONS of "bridged" construction.



Buyer's Comparison Chart will guide you to full information  
A Comparison of ALL Automatics is in Favor of Cone



# Conomatic}

CONE AUTOMATIC  
MACHINE COMPANY, INC.  
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# The Newest DEVELOPMENT

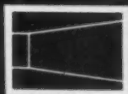
## IN POWER TRANSMISSION - TAPER ROOT INVOLUTE SPLINES



TAPER ROOT PARALLEL KEY HOBS REQUIRE SUBSTANTIAL GENERATING LUGS TO INSURE STRAIGHT AND PARALLEL KEYS TO THE ROOT DIAMETER. TO ELIMINATE ASSEMBLY INTERFERENCE, THESE LUGS ARE SUBJECT TO QUICK WEAR AND REDUCE HOB LIFE.



TAPER ROOT INVOLUTE HOBS REQUIRE GENERATING LUGS APPROXIMATELY 1/2 THE HEIGHT AND WIDTH OF THOSE USED FOR PARALLEL KEY DESIGN. IN SOME CASES THESE MAY BE ELIMINATED ENTIRELY, ADDING ADDITIONAL ROOT CONTACT AREA.



MATING HUB LOCATES ON THE TAPER. INVOLUTE FORM IS SELF-CENTERING. ALL LOAD STRESSES AND BEARING ARE EQUALIZED. STANDARD BROACHES ARE USED AFTER FINISHING THE TAPER HOLE TO SIZE.



SINGLE INVOLUTE HOB CUTS ANY STANDARD P.D. OF THE SAME PITCH. AND ANY CONVENTIONAL INCLUDED ANGLE. LESS STOCK REMOVAL PER TOOTH SPACE PERMITS LARGER SHAFT CAPACITY IN THE MACHINE.

### PROVIDES

**V** APPROXIMATELY 50% GREATER CONTACT AREA

### GIVES

**V** STRONGER MOUNTINGS WITH SIMPLIFIED TOOLING

### PERMITS

**V** EASIER MACHINING WITH PREDICTABLE ACCURACY, AT LOWER TOOL COSTS

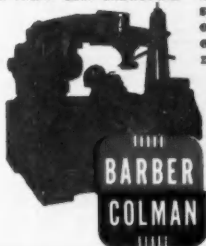


### Write

One of the outstanding advantages of Taper Involute Splines, recognized by design engineers, is that standard gear methods are used to

produce them. You are invited to send for full information on the methods used to hob these splines easily, rapidly and economically, using Barber-Colman Hobs and Machines.

Send prints and specifications for estimates to our engineers, Department 7608.

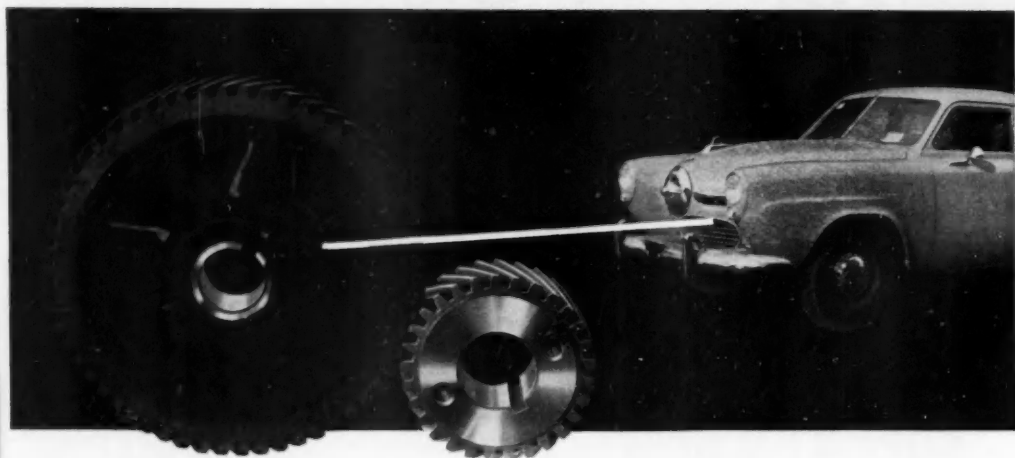


# Barber-Colman Company

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# CELORON

... what's in it for you and your products?



*Timing Gears made from CELORON help build STUDEBAKER'S reputation for dependability.*

What's in CELORON for you... and your products? This different thermo-setting plastic maintains strength and resiliency at temperatures up to 290°F. Resists oil, water and many corrosive chemicals. It is 1/6 the weight of steel—only 1/2 the weight of aluminum! Remarkably easy to machine, Continental-Diamond's CELORON gives you an unusual combination of light weight, high strength, and wear resistance *plus* electrical insulating properties.

CELORON is another example why it pays to see C-D first in your search for the right plastic. For plastics that provide *practical* combinations of mechanical and electrical properties, call your nearest C-D office. Trained technicians on hand at all times to help with your material selection problems.

#### CELORON—ideal for many mechanical and electrical applications

Specific Gravity .....	1.35	Impact Strength (Izod)	
Tensile Strength .....	6,500 psi	(per inch of notch).....	2.3 Ft. Lbs.
Flexural Strength .....	10,000 psi	Brinell Hardness—500 kg. load .....	38
Compression Strength.....	25,000 psi	(10 mm diameter ball—30 seconds)	
Shearing Strength .....	8,500 psi	Rockwell Hardness .....	M105



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# THE ECONOMICAL OIL SEAL FOR LIMITED SPACE APPLICATIONS

## VICTOR VICTOPRENE TYPE K3

for Shafts up to 2-inch Diameter

### TAKES LESS SPACE AXIALLY AND RADially

This modern Victoprene oil seal fits the most compact shaft assemblies. Minimum over-all dimensions of K3 seals in all sizes eliminate the usual problem of adequate housing space.

### ONE-PIECE MOLDED CONSTRUCTION

Extreme compactness means no sacrifice of sealing efficiency. Sustained high performance is assured with a specially developed construction. The Victoprene sealing element and metal channel are molded into one integral unit, with a continuous coating of Victoprene on face and outer periphery.

### SUITED FOR WIDE APPLICATION

Victoprene has the highest rating for resistance to lubricants, heat, and aging. It meets the needs of most sealing services as proved in countless applications. Structurally, K3 seals have withstood the severest tests in laboratory and field.

### GET THIS DESCRIPTIVE CIRCULAR

Sizes, dimensions, service recommendations and installation data on K3 seals are given in Circular S-790, sent on request. Write direct, or ask your Victor Field Engineer for a copy. No obligation.



Victor Manufacturing & Gasket Co., and its affiliate Victor Sealing Products Co. Inc., P. O. Box 1333, Chicago 90, Illinois.

## 7 Features of the K3 Thin Seal



supplied  
with or without  
garter spring

**1 .250" OVERALL WIDTH IN ALL SIZES**, maintained to plus or minus .015". Available currently for shaft diameters from .312" to 2.000".

**2 IMPROVED VICTOPRENE SEALING ELEMENT** retains full efficiency at all shaft surface speeds up to 3000 F.P.M. and at temperatures from minus 40 deg. F. to 275 deg. F.

**3 NEW ONE-PIECE MOLDED CONSTRUCTION**—Sealing element is simultaneously molded and permanently bonded with metal channel to form one integral unit. Continuous coating of Victoprene on face and outer periphery of body provides effective sealing at these points.

**4 GREATER FLEXIBILITY — LESS FRICTIONAL DRAG**—Hammerhead design (limited contact of sealing face) with its adjoining thin wall section provides maximum flexibility

in sealing element action, with minimum drag on shaft.

**5 NON-SHIFTING SPRING TENSION**—Type K3 seals equipped with garter spring have a molded "V" groove in sealing element which holds spring in proper location to maintain uniform pressure around the shaft.

**6 EASY TO INSTALL**—A rigid frame for installing the seal is provided by the integral metal channel. The tapered lead-in on the toe side of outer periphery locates the seal and permits easy entrance into the bore. General procedure for pressing into bore is the same as for metal encased seals.

**7 PERMANENT IDENTIFICATION** appears on the face of each TYPE K3 seal, giving the catalog number, shaft size, and the name "Victor."

SEALING  
PRODUCTS  
Exclusively



# VICTOR

GASKETS • OIL SEALS

**T**HREE distinct lines of cars with a total of 21 models represent Kaiser-Frazer's bid for its share of the automobile business this year. Designated as 1951 models, the K-F offering includes the Kaiser line—new mechanically and with fresh, sparkling styling—in a range of 12 models; the low-priced line (Name-the-Car) to be announced in June, available in standard and deluxe two-door models, offered with a four- or six-cylinder Willys-K-F engine; and the restyled Frazer line consisting of five, four-door models.

Two mechanical features of outstanding interest are found in this announcement. The first is the adoption of Hydra-Matic drive as optional equipment on all Kaiser and Frazer cars. In addition, K-F will supply overdrive as optional equipment. The second item touches on improvements in the K-F six-cylinder engine, including an increase in output to 115 hp, up three hp over last year.

Perhaps the most outstanding aspect of K-F's story is the development of a "low-priced" car which is being tooled rapidly and expected to be in production in June. This car will be shown at the Chicago Automobile Show this month. It has a two-door body mounted on a short wheelbase chassis, with seating capacity for five. Seating is arranged for three in front and two in the rear compartment. The body has a fixed rear panel, hence no trunk lid, the luggage compartment being accessible from the inside of the car. At the option of the buyer, the chassis can be fitted with either a four-cylinder or six-cylinder engine to be supplied by Willys. The styling of this car is very pleasing to the eye, modern without being radical, and free from gadgetry and ornamentation.

*Frazer-Manhattan Hardtop showing restyled fender treatment and front end. Note the center pillar of chrome-framed plate glass.*

### Kaiser-Frazer Supersonic Engine Condensed Specifications

(6-cyl L-Head)

Bore (in.)	3 $\frac{5}{16}$
Stroke (in.)	4 $\frac{3}{4}$
Displacement (cu in.)	226.2
BHP (max.)	115 @ 3650 rpm
Torque (lb ft max.)	190 @ 1800
Compression Ratio	7.3 to 1

The Kaiser models are new from stem to stern. As shown in the illustration, the Kaiser is distinctively styled in Continental fashion with unusual eye-appeal although not radical in appearance. It is mounted on a new 118½-in. wheelbase chassis with low center of gravity. The body is said to have larger glass area

## New Low-Priced 1951

By Joseph Geschelin





*Three-quarter view of Kaiser-Frazer's new low-priced car. It has a two-door, five passenger body mounted on a short wheelbase chassis with seating arrangements for five—three in the front and two in the rear.*

**Model in**

# Kaiser-Frazer Series

**Small Car Will Be Available in Standard and DeLuxe Types With Four or Six Cylinder Engines. Hydra-Matic or Overdrive Offered as Options on Newly-Designed Kaiser and Frazer Cars. The K-F Six Cylinder Engine Has Been Improved and Horsepower Increased to 115.**

than customary and an unusually narrow, set back A-pillar for better front vision. Interior treatment is luxurious and in excellent taste, with lounge-type seats, and exceptional leg and head room. Side glass mounted almost flush with outside body panels, is said to effectively reduce wind noise. Doors are arranged to open 75 deg, thus affording easy entry and egress, have freeze-proof locks with door latches completely effective against accidental opening of doors. Front seats are adjustable within a range of seven in. and have provision for elevation.

As illustrated, the gas tank is of kidney shape to provide room for a recessed tire well. The well lies under the floor line and leaves the entire trunk area for usable luggage space. Another feature of interest is the removable rear fender.

The instrumental panel is quite unique and features a full-padded crash absorbing roll completely across the full width of the panel. The essential instruments are located in a single housing directly in the driver's line of vision. A high-capacity fresh air conditioning system is available with defrosting across the

## Major Specifications 1951 Kaiser-Frazer

	Kaiser Special	Kaiser DeLuxe	Frazer
Wheelbase (in.)	118 $\frac{1}{2}$	118 $\frac{1}{2}$	123 $\frac{1}{2}$
Overall length (in.)	208 $\frac{1}{4}$	210	209
Overall height (loaded)	60.25	60.25	64 $\frac{1}{2}$
Overall width	74	74	72 $\frac{7}{8}$
Shipping weight (lb)	3125	3225	3347
Tire size—Std.	6.70-15	6.70-15	7.10-15
—Opt.	7.10-15	7.10-15	
Rear axle ratio			
—Std.	3.91	3.91	3.73
—Overdrive	4.55	4.55	4.27
—Hydra-Matic	3.54	3.54	3.54
Front cushion width (in.)	64	64	62
Rear cushion width (in.)	63	63	62 $\frac{1}{2}$

entire windshield line. A pistol-type hand brake control is located at the driver's right next to the ignition switch.

The "Supersonic" engine, used on all Kaiser and Frazer cars, has the same mechanical specifications as before but incorporates many new features of interest, particularly an increase in output to 115 bhp (maximum). Much of the increase in performance is credited to the elimination of friction and vibration and in improved mounting of the engine. This has resulted, it is claimed, in much smoother operation and still further improvement in fuel and oil economy.

The cylinder block has been reinforced to provide added rigidity and fitted with extra heavy main bearing caps. The crankshaft is 100 per cent counterbalanced. Aluminum alloy, Auto-Thermic pistons, balanced to 0.2 oz are fitted with a chromium-plated top

## 1951 Kaiser-Frazer

ring. Valve tappets have been changed to mushroom type. In addition, the engine has a new, low sump oil pan which permits the pressure lubricated connecting rods to rotate above the oil level, with a reported reduction in oil heating and fogging. Too there is an improved and sealed cooling system. Another feature of the engine, not new but not emphasized heretofore, is the use of the Good-year wedge-type accessory drive belt.

Brakes have been improved to reduce high speed fading. The centerpoint steering linkage also has been improved with the addition of a bearing on the center arm. Steering is said to have improved control, with steering geometry claimed to stay put once it is properly adjusted. On the Kaiser, the improved steering gear reduces turning radius to 18 ft.

In general the Kaiser chassis embodies close attention to proper weight distribution, center of gravity of only 22.7 in. but with ample road clearance, and improved springing to give better riding quality. Rear springs are two in. wide, completely covered and lubricated for life so as to control friction.

Supplementing the lower-priced Kaiser line, described above, K-F has groomed a completely restyled line of Frazers. Although the basic bodies remain the same in the models noted for 1951, considerable change has been effected in exterior appearance by the development of new front and rear fenders and sheet metal, with front and rear fenders having a swept-back effect. The grille also is new. The rear quarter

Right-side view of the new small car which will be available with either a four- or six-cyl engine.



## Line Has New Low-Priced Model

1951 Kaiser four-door sedan.



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### 1951 Kaiser-Frazer Body Styles

#### KAISER (Special and DeLuxe)

Four-door Sedan  
Two-door Sedan  
Club Coupe  
Business Coupe  
Two-door Traveler Utility Sedan  
Four-door Traveler Utility Sedan

#### FRAZER

Four-door Sedan  
Vagabond Utility Sedan  
Four-door Manhattan Convertible  
Four-door Manhattan Hardtop  
(with or without nylon covering)

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panels, deck lid, hood, and bumpers also are said to be new. The rear window is wider and deeper on the standard models.

The Manhattan line has a new roof panel similar in lines to that of the convertible. It has a center pillar of heavy chrome-framed plate glass which provides additional visibility as well as structural support. The hardtop models now are available either with or without the all-weather Nylon roof covering.

In addition to the new engine, the Frazer has an improved front and rear suspension system, reinforced box-type frame, covered and permanently lubricated rear springs, and a heavier clutch.

*This view of the rear end of the 1951 Kaiser chassis shows the kidney shaped fuel tank which allows room for a recessed fire well, leaving the entire trunk area for usable luggage space.*



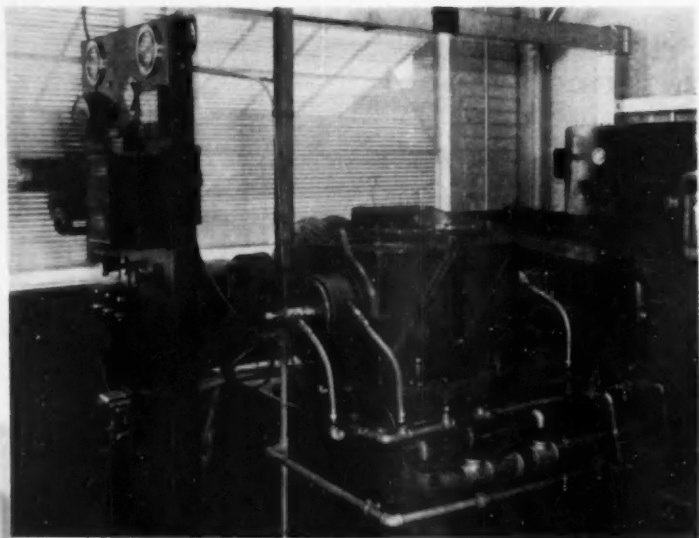


Fig. 1—Heavy duty, centrifugally loaded bearing tester. The test machine housing is bolted to a heavy steel bedplate which is supported on spring type vibration isolators. The concrete footing to which these vibration isolators are secured also supports a 20-hp electric motor for driving the machine.

## Development of A Heavy Duty

THE value of bearing test machines is generally recognized in bearing engineering work. A properly designed bearing test machine can be successfully used to quickly obtain comparative information on bearing materials that would be difficult to obtain by actual service tests. The relative simplicity of the bearing test machine permits control or elimination of many of the factors affecting bearing operation which are encountered when a test bearing is only one of many operating parts in a unit.

The Allison Div., General Motors Corp. Bearing Plant, uses cen-

trifugally loaded bearing testers, one of which is shown in Fig. 1. These machines are the product of 17 years of development, during which time continual improvement has resulted in a machine which is rugged and

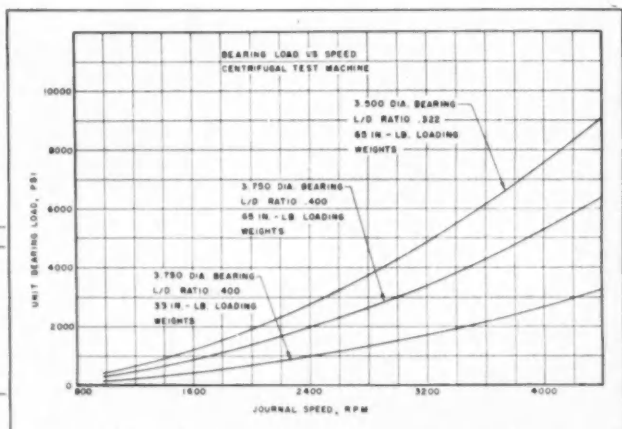


Fig. 2—Relationship between load and journal speed. These are only a few of the many possible test conditions.

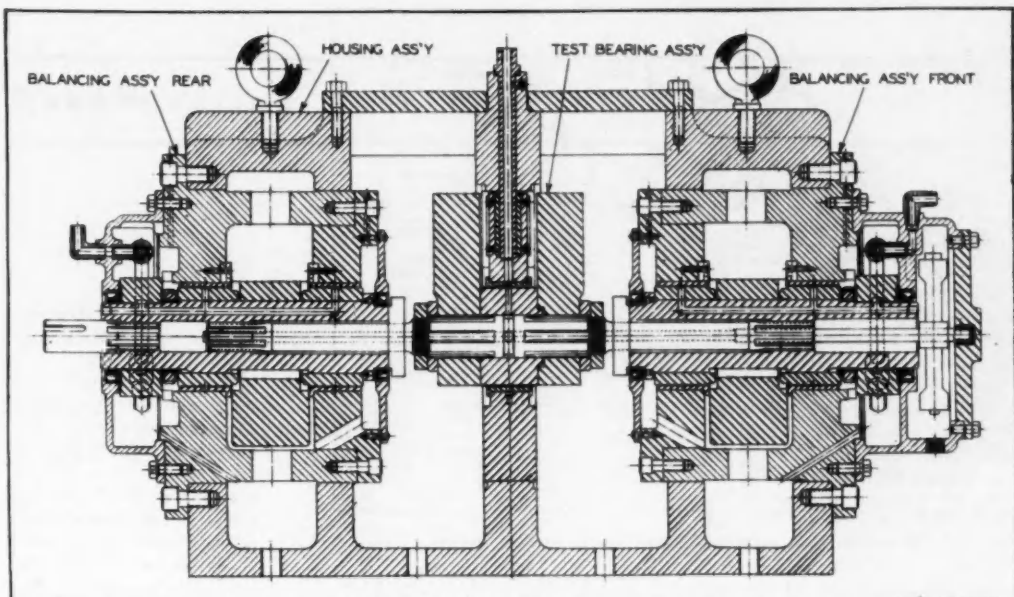


Fig. 3—Longitudinal section showing the housing assembly, test bearing assembly, and balancing assemblies—front and rear.

# Bearing Test Machine

trouble-free. This machine was designed for the testing of heavy duty aircraft engine bearings, and is capable of imposing more than 34,000 lb of load on the test bearing at a journal speed of 4200 rpm. The load is calculated from the expression,  $F = \frac{m V^2}{r}$  where

$F$  = Bearing load

$m$  = Mass of the eccentric weights producing the centrifugal force

$V$  = Linear velocity of the center of gravity of mass  $m$

$r$  = Distance of center of gravity of mass  $m$  from the axis of rotation

Fig. 2 illustrates the relationship between load and journal speed for a few of the many possible test conditions. By the selection of eccentric weights of various masses any desired speed-load relationship within the structural limitations of the machine can be obtained.

The longitudinal cross section, Fig. 3, shows the four basic assemblies of the test machine which are as follows: Housing assembly; test bearing assembly; balancing assembly—front; and balancing assembly—rear.

The housing of the machine is divided into four compartments. The test bearing assembly is located in the two center compartments and consists of two eccentric weights separated by a replaceable journal and splined to a shaft. The replaceable journal is locked to the weights so that journal weights and shaft rotate as a unit. This test bearing shaft is connected to the front and rear balancing assemblies by splines. The centrifugal force created by the rotation of the eccentric weights is almost entirely applied to the test bearing as only a small force is required to deflect the test bearing shaft to its running position.

The two balancing assemblies support weights which counterbalance the test bearing loading weights and one of the two balancing assemblies also transmits the torque of the test machine driving motor to the test bearing shaft. Two heavy duty aircraft type prefit bearings support the balancing weight of each balancing assembly. The load on these bearings is only one-fourth of the load applied to the test bearing and because of the sturdy construction edge loading is very small. Many

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**By Earl J. Clark**

Senior Project Engineer, Bearing Plant,  
Allison Division, General Motors Corp.

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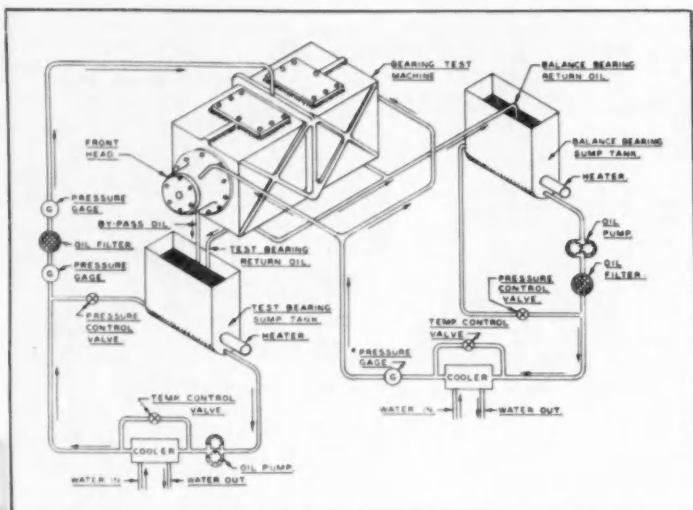


Fig. 4—Test bearing and balancing weight bearing lubrication systems.

of these bearings have operated trouble-free for 8000 to 12,000 hours.

The lubrication of the test machine is illustrated in Fig. 4. By using two independent lubrication systems, the possibility of damage to the balancing weight bearings is eliminated when experimenting with special test bearing lubricants. Lubricant pressures and temperatures also can be independently controlled in the two systems. The oil flow characteristics of the test bearing can be controlled to simulate a main crankshaft bearing designed for pressure lubrication to main and connecting rod bearings by means of a rotating arm fastened to the front balancing assembly shaft. This arm carries a replaceable orifice controlling the oil flowing from the center of the drilled test bearing journal in a manner similar to a crankshaft main bearing. The test bearing can be lubricated through the test bearing journal or through the bearing back as desired. When lubricating the test bearing through the journal the rotating arm assembly previously described is replaced with an assembly containing an oil transfer bearing. The test machine shown in

Fig. 1 is set up to lubricate through the test bearing journal.

The split-type test bearing carriers have presented a problem because of bore out-of-roundness after a few hundred hours of testing. It was found that the use of hollow dowels about the two studs which fastened the carrier together was unsatisfactory. By combining dowels with serrated carrier split faces, Fig. 5, carrier bore out-of-round can be held within 0.001 in. in 4 1/8 in. diameter bore after 2000 hours of use.

The method of location of the test bearing in the test machine housing, shown in Fig. 6, required a considerable amount of development work. The neces-

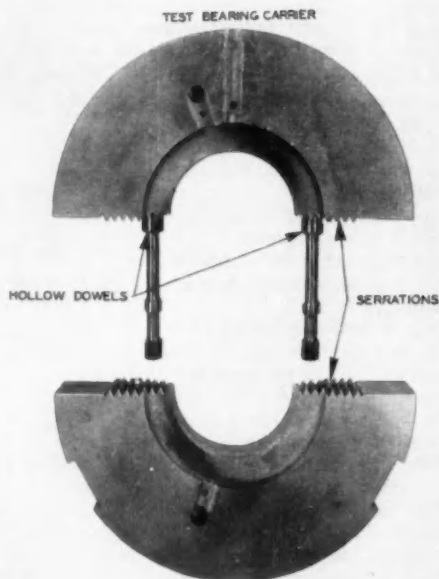


Fig. 5—By combining dowels with serrated test bearing carrier split faces as shown, out-of-round can be held within 0.001 in. in 4 1/8 in. diameter bore after 2000 hours of use.

## Duty Bearing Test Machine

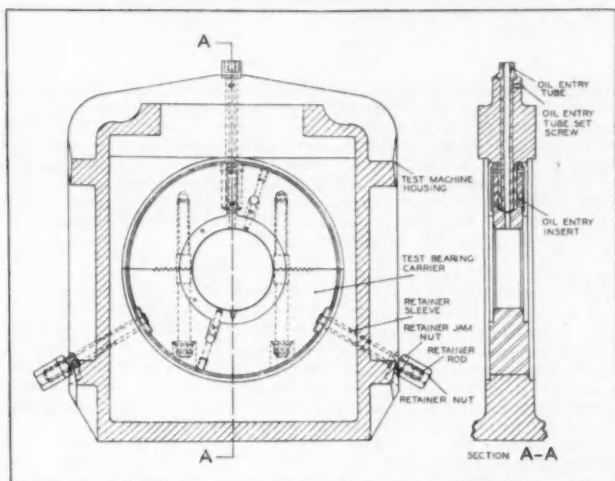


Fig. 6—Method of location of the test bearing in test machine housing.

sary assembly clearance between the bearing carrier and the housing places a high reversing load on any radial locating device; however, by using high strength materials and locating threaded members outside of the machine so that replacements can be made during a test, if required, satisfactory operation has been attained. The vertical locating member is also used to supply oil to the test bearing. In previous designs the oil entry pipe was used to restrain both radial and axial movement of the carrier by using it as a stud and locking it as a stud, and locking it to the housing. Thread abrasion when removing or installing the test bearing assembly frequently contami-

nated the lubricating oil and caused bearing failures. Thread abrasion at the oil entry tube was eliminated by removing the threads from the tube and allowing it to control axial motion only. Testing of this design showed that the two lower fasteners furnished adequate radial control of the bearing carrier.

Test bearing temperature measurements were originally made by permanently fastening a thermocouple wire directly to the test bearing by means of soldering or drilling and pinning with a metal pin. Either fastening method was rather delicate and required an appreciable amount of care to prevent test bearing damage. To eliminate these difficulties a spring-loaded contact button was designed to bear against the back of the bearing,

Fig. 7. Testing showed that a temperature difference of approximately 2F exists between the two methods of thermocouple installations, the former method indicating the higher reading. In a previous contact button

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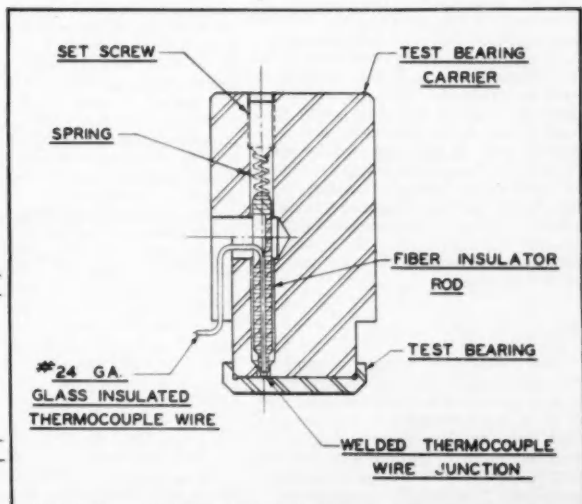


Fig. 7—Test bearing thermocouple installation. Note the spring-loaded contact button which bears against the back of the bearing.

# AIRBRIEFS



By ROBERT McLARREN

## Prototype Dead?

Secretary of Air Force W. Stuart Symington sprung a surprise when he told a Congressional committee that the Air Force no longer urged enactment of the so-called "Prototype Bill" legislation on advice of the Bureau of the budget and, hence, President Truman. The legislation would authorize the government to subsidize the design, construction and test flight program of new transport aircraft, thereby filling the current financial void in both airline and manufacturing companies which is stymying new transport development. From a general luke-warm attitude on the part of all concerned a year ago, support for the idea had quickly mounted until all interested groups were strongly supporting it—until Symington's testimony dashed cold water on the proposal. Basic idea of the legislation is that the new transports, powered by gas turbine engines, would be adaptable to both military and commercial use, an outgrowth of World War II experience with the Douglas DC-3 and DC-4 (C-47 and C-54). The arguments are long and tedious on both sides, ranging all the way from the threat of British leadership in the field to the probability of favoritism in the award of contracts. The legislation proposed would have barred the Air Force from developing new transports on its own, surely one reason for Symington's veto of the idea. Off the record, the Air Force does not believe that a joint transport could have maximum usefulness to either military or civilian operators. The Air Force has repeatedly asked for a 50,000-lb payload in any future transport, and commercial airlines have not yet expressed interest in an airplane that big; 175,000-lb gross weight compared to about 100,000 lb for current DC-6 and Constellation production. Proponents still plan to continue their battle, but it will be uphill from now on with Air Force out of the picture.

## Crying Wolf

The National Advisory Committee for Aeronautics reveals, in its latest annual report, "a healthy pressure upon it from the military air services and from the aircraft industry for advanced scientific data." The demand, the report continues, is for advanced scientific knowledge "for immediate application."

While this pressure assuredly exists, we wonder about the sincerity of it. A case comes to mind of the development of flush air intake ducts by the NACA in 1944-45. First aircraft to take advantage of the idea was the Ryan XFR-4, a development of the Ryan "Fireball" carrier fighter. The new model was 75 mph faster than the standard and, although it featured an increase of about 12-1300 lb of thrust through a jet engine change, about 25 mph was due to the new inlets. Lockheed applied the NACA flush inlets on their special P-80R racer and promptly raised its top speed by a substantial margin. Latest installation is on the newly test-flown North American YF-93A fighter, in which the Air Force reposes special trust and confidence. The new model is supersonic, compared to the high subsonic speed of its parent F-86 Sabre fighter. It would appear, then, that about five years have slipped by while the industry toyed with the NACA flush air inlet. There are a hundred other NACA developments quietly gathering dust while the industry energetically exerts a "healthy pressure" for more data "for immediate application."

## Patient vs Doctor

Not excepting the automobile business, we are convinced that the aviation business has a thicker fringe of freelance advisers than any other business in America. There are few days that pass without a weighty pronouncement of what is "wrong" with the business accompanied by a neat "steps one, two and three" solution to all its problems—this usually from some student wholly outside the business. Most recent conclusion, widely reached, is that our only salvation lies in gas turbine transport planes; otherwise—oblivion. But the patient, not understanding the doctor's Latin, seems to feel fine. In the midst of the uproar for jet transports, it is of interest to note that: (1) United Air Lines has just placed an order with Douglas Aircraft Co. for six more DC-6 transports; (2) Trans World Airlines has just placed an order for six Lockheed Constellation transports with Hughes Tool Co., only a few months after ordering 20 new Constellations from Lockheed Aircraft Corp.; (3) TWA and Eastern Airlines are putting the finishing touches on a joint purchase agreement with Glenn L. Martin for 65 new Martin 2-0-2 transports; all

of which are very old-fashioned airplanes powered by piston engines driving propellers. It is also of interest to note that domestic airlines netted \$25 million during 1949, carried more passengers, flew more miles and set a new safety record while doing so. From here, at least, oblivion looks swell!

## Electric Test Pilot

While the huge electronic calculator of the Army Ordnance Dept. at Aberdeen, Md., continues to fight the battle between a B-36 bomber and Banshee fighter, Massachusetts Institute of Technology reveals that it has developed a calculator which handles the flight tests of a new airplane! The new machine, developed under Navy contract, is a "flight simulator" designed to work out the equations of motion for a new design. The new device consists of an "electronic airplane" mounted within a set of gimbal rings. Stability derivatives and major airplane parameters are then set up in the electronic circuits of the analyzer. One of these parameters is then varied, causing the simulated airplane to gyrate within its gimbal rings in accordance with pre-determined characteristics. The answer comes out in the form of a trace pattern on moving graph paper. These are then interpreted qualitatively as a "flight test" report on the various possible configurations of the airplane, making it easy to select the best.

## Afterburner Now Standard

The afterburner, which gives a turbo-jet engine 30 to 50 per cent added thrust, has rapidly become a standard engine accessory for high-performance combat aircraft and both Air Force and Navy specify it as a matter-of-course on all new design. The Air Force is currently operating the McDonnell XF-88, Lockheed XF-90, Convair XF-92A, North American YF-93A and Lockheed F-94A with afterburners permanently installed. The Navy's Vought F6U and XF7U are currently equipped and both McDonnell F2H and Grumman F9F are being readied. The device consists simply of fuel lines in the tailpipe. Fuel is sprayed into the hot gases and the resulting burning provides the augmented thrust. But its use poses several problems, some of them of major significance. The resulting very high

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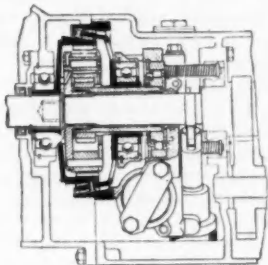
# British Experimental

## Underdrive and Overdrive Units

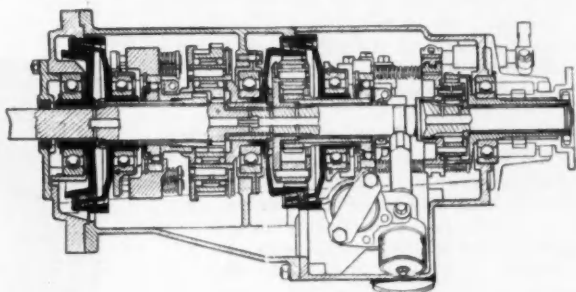
**A**N underdrive, an overdrive, and a four speed transmission have been uncovered by Laycock-De Normanville in England, after experiments extending over three years. The underdrive, which is not intended for application to existing vehicles, consists of an epicyclic train giving a reduction of about 1.45 to 1. Its claimed advantages are that change of ratio can be effected easily without any use of the clutch and at any speed or load.

The underdrive mechanism is located between the engine and

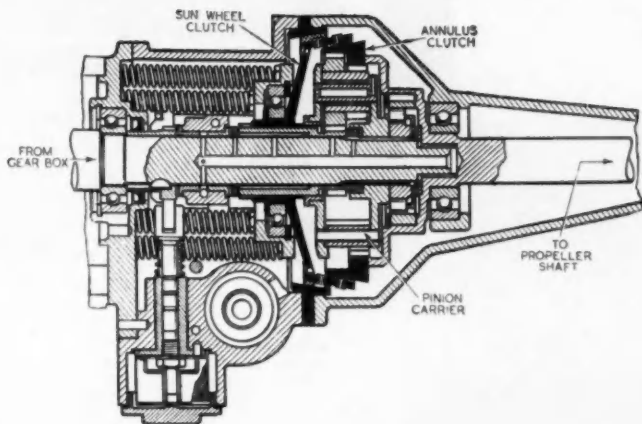
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Basic unit of the Laycock - De Normanville planetary underdrive.



Four - speed planetary transmission consisting of two underdrive units in tandem and a sliding dog forward - and - reverse mechanism.



Experimental setup on Standard Vanguard using Laycock - Normanville overdrive changing the gear ratio in high from 4.625 to 3.79 to 1.

# Hot-Skinning Eliminates Oil-Canning of Thin Sheet Metal

By A. L. Schoellerman

Supervisor, Process Engineering  
Northrop Aircraft, Inc.

**T**HE need for covering control surfaces with thin sheet metal has become more pronounced with the overall increased speed of airplanes. In addition to high air loads as a factor in choosing to cover the control surfaces of the B-35 type airplanes with sheet metal, a fire hazard or problem existed which was peculiar to the design, the main landing flaps being attached to the rear and in the path of hot exhaust gases from the turbo superchargers. The technique of "hot-skinning" these assemblies was developed at Northrop Aircraft to permit covering them with thin sheet metal which would be taut and free of "oilcans."

Upon considering this development, a number of problems existed, namely: Could the job be accomplished without resultant buckling of the structure and without "oilcans" existing in the skin panels, in particular, since they were inherent in the sheet metal as received from the rolling mills or suppliers? Could the panels of thin sheet metal be riveted without deformation resulting? Could heat be used and temperatures controlled satisfactorily? What kind of rivets could be used? Would it be possible and practical to use flush rivets and expect to dimple the thin panels? What source of heat would be the most advisable? What type of

material would be the most suitable?

The use of infra red lamps as a source of heat was disbanded with due to the hardship it created on the mechanics. Heating blankets seemed to be the most suitable source of heat from the results obtained on test elevators, consequently, enough were ordered to "hot-skin" a production rudder. The 0.016 in. gage FS-1h magnesium sheets used to cover the first structure were found to be unusually taut. In fact, those test elevators covered with magnesium were tighter and more free of "oilcans" than those covered with 75ST Alclad. On the basis of these results, a large B-35 landing flap and elevon were covered with magnesium.

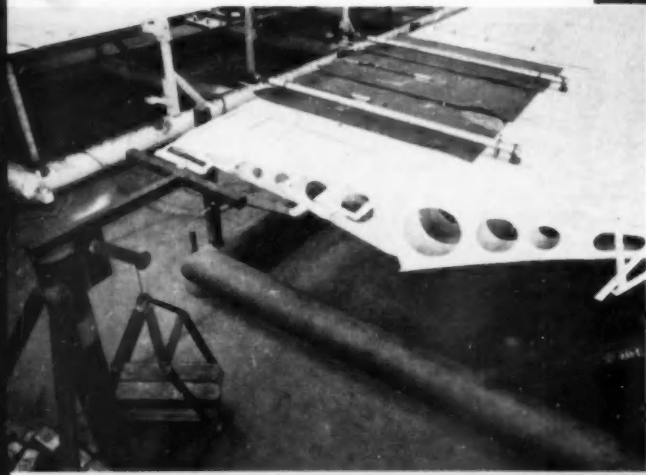


(above)

Mechanical tension is applied to the sheet metal as shown here to eliminate "oil-canned" areas which would not be in contact with the heating blankets.

(Left)

Heating blankets are placed on the structure while it is in a horizontal position. Vertical suspension of the control surfaces is not practical as the blankets would not lie flat against the sheet metal panels.



A few "oilcans" existed between some of the ribs of the first elevon covered. In addition, the trailing edge was buckled somewhat. An analysis indicated that longitudinal (spanwise) expansion of approximately 0.10 in. in 180 in. had taken place.

It was, of course, concluded that too much heat had been used, resulting in high skin stresses existing after the structure had cooled. In order to solve this problem, thermostats were installed on the blankets, their temperature reduced slightly and progressively on different assemblies being covered, 150° F finally resulting in the optimum temperature to use. The amount of ballast exerting spanwise tension on the panels was decreased from approximately eight lb per in. width of panel to about three lb. In addition, a jig was built which would support the structure horizontally and hold the comparatively flimsy trailing edge rigidly in line. These precautions and/or changes in procedure yielded very satisfactory results.

Conventional AD, B or DD rivets are difficult to use for attaching thin metal sheets without deformation occurring around the rivets. Blind rivets were used with a good degree of success. When rivets having

A17S sleeves were installed in magnesium sheets they were dipped in a thickened mixture of zinc chromate primer and zinc chromate paste just prior to insertion for pulling-in the pins. The magnesium panels were attached in the chrome pickled and primed condition.

Instead of the lap joints formed between magnesium and aluminum on the external surfaces of the assemblies being sealed with tacky zinc chromate high-pressure compound, two coats of primer only were applied to each faying surface area and permitted to dry before installation in order to prevent metal chips from hole drilling accumulating between the panels. The finished structures received one coat of zinc chromate primer which afforded protection to the broken-off pins of the blind rivets. The technique used also precluded any attempt to dimple the panels and install flush rivets. Fifteen thousand blind rivets were used on a single elevon structure to attach the thin sheet metal panels.

When covering large assemblies, panels were spliced to make a sheet larger than the area of the structure to be covered — large enough to permit attachment

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## New Ferrari Engine

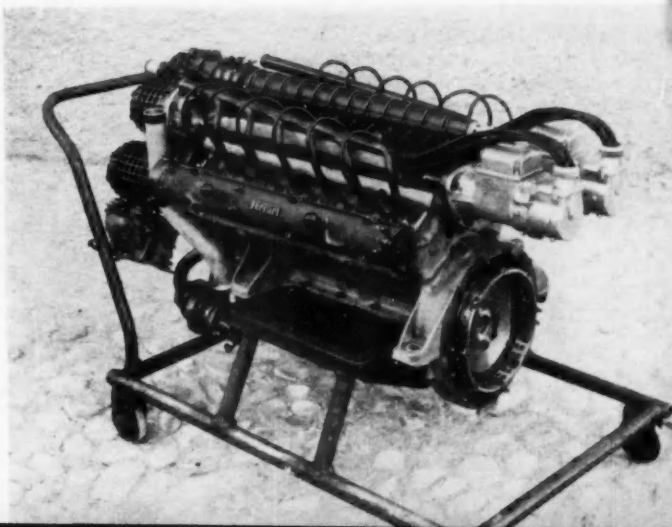
ONE of the very few European firms engaged exclusively in the production of sports and racing models, Ferrari, of Modena, Italy, now has six types of the same general design. The latest model has a 12-cyl engine of 91½ cu in. piston displacement, equipped with a two-stage Roots type blower, and is claimed to develop 280 hp at 7000 rpm.

In common with all the Ferrari models, cylinder blocks and crankcases are a one-piece light alloy casting, with separate cylinder liners; the head is light alloy and has two valves per cylinder with operation by overhead camshaft and rockers for each bank of cylinders. Chains are used for camshaft drive. The blowers are at the front, driven by the crankshaft, and each bank of cylinders has its own magneto, driven from the rear of the camshafts. The crankshaft is carried in seven main bearings.

The racing chassis has an oval-section tubular frame,

with independent suspension front and rear by transverse springs. With a track of 47¼ in. and a wheelbase of 91¼ in. the single seater racing model weighs 1276 lb when equipped with 5.50-16 tires in front and 6.50-16 at the rear.

The 122 cu in. engine, with a single stage supercharger, develops 300 hp at 6500 rpm, and the car has a racing total weight of 1364 lb with the single seater body.



*Latest model 12-cyl, 91½ cu in. racing engine with two-stage supercharger. Output is 280 hp at 7000 rpm.*

# The Trend in Europe to Torsion

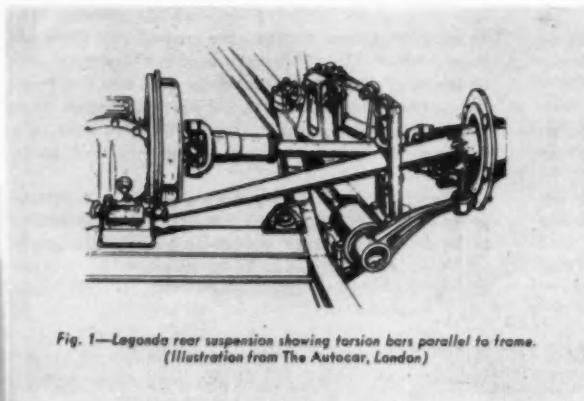


Fig. 1—Lagonda rear suspension showing torsion bars parallel to frame.  
(Illustration from *The Autocar*, London)

**A**MONG the less conventional designs is the Lagonda which has coils for the independently sprung front wheels and long inclined torsion bars for the independent rear wheels. The chassis of this car is distinctive in forming an X, the outer extremities of which are linked by two tubular stringers. The differential housing is attached to the frame, with the brakes immediately to left and right of it. The drive to the rear wheels is by open shafts. Each rear wheel spindle is carried by a triangulated link, the tubular arms of which are pivoted on the frame by ball joints in rubber mountings. The torsion bars are within and parallel to the main frame members, the two forward ends being anchored in a bracket in the angle formed by the frame. At the rear or axle end there is a lever connected through a short link and ball joint to the stub axle assembly as shown in Fig. 1.

Vauxhall, in 1935, adopted the Dubonnet suspension system, with independent front wheels. In 1938 this was modified for the passenger cars, torsion bars replacing the enclosed coil springs featured

by Dubonnet. Each wheel is independently mounted on a carrier arm forged in one piece with a spindle. The rocker shaft, carried in two needle bearings at the rear of the housing, is provided with internal and external serrations, the internal serrations engaging with outer end of the torsion bar, which runs laterally through the rocker shaft and thence through the length of the torsion tube. At the inner end the torsion bar is secured to the tube serrations (see Fig. 2). The action of the torsion members is modified by a short pre-compressed coil spring acting upon a toggle lever mounted on the serrations formed on the outside of the rocker shaft, as shown in Fig. 3. The coil spring reacts against a knife edge fitted to one end of the suspension housing. When suspension movements occur, thus twisting the torsion members, the spring and toggle lever move out of line, enabling the spring to exert a twisting effort on its own account. The result is to soften the suspension for normal riding, but as the effect of the coil spring rapidly diminishes with increasing movement, the suspension as a whole become progressively stiffened.

Panhard presents quite a distinctive design of rear torsion bar suspension. The axle is a "V" tube, the point of the "V" having a ring by which it is pivoted in

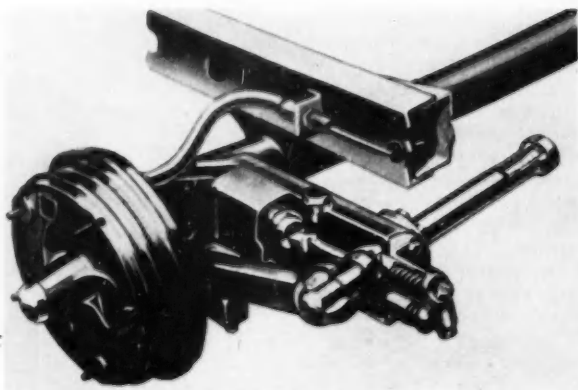


Fig. 2—Part cut-away view of Vauxhall front suspension. Note the torsion bar inside the tube.

# Bar Suspension

## Part Two

*This article, the second dealing with torsion bar systems in European passenger cars, describes those used by Lagonda, Vauxhall, Panhard, Bristol, Chenard & Walcker, and Mercedes and Volkswagen. The first article, published in the February 1st issue of AUTOMOTIVE INDUSTRIES, described the Armstrong-Siddeley, Jaguar, Riley, Jowett, Morris, Wolseley, and Citroen systems.*

**By W. F. Bradley**

Special European Correspondent for  
AUTOMOTIVE INDUSTRIES

rubber bushings to a bracket welded on the center of the rear tubular frame cross member, as shown in Fig. 4. The two extremities of the tube carry the wheel hubs and each one is linked up by a radius arm to the torsion bars mounted behind the main chassis tube. This gives a triangulated attachment of each wheel and is the subject of a patent taken out by the Panhard company.

Instead of the single torsion bar usually employed, Panhard makes use of a grouping of three bars for each wheel, mounted across the frame behind the tubular frame member, and forming the base of the triangle. The three bars are united at their inner end to a coupling on the center of the cross member. At its outer end the central bar is splined to a ring on which the suspension or radius arm is mounted. The outer end of this arm has a rubber-bushed cone attachment to the wheel spindle support. A hydraulic shock absorber is connected by a link to each radius arm. The design makes it possible to use short torsion bars, unsprung weight is reduced, there are no lubrication points, and as the cross tube is flanged and bolted to the chassis side rails, the entire rear end can be removed after withdrawing four bolts on each side and disconnecting the brake rods.

The only other attempt at multiple torsion bars is by Chenard & Walcker. This firm has patented a sys-

tem of small diameter bars, forming a pack preferably of square section, but with a possibility of oval section.

For racing purposes torsion bar suspension has been

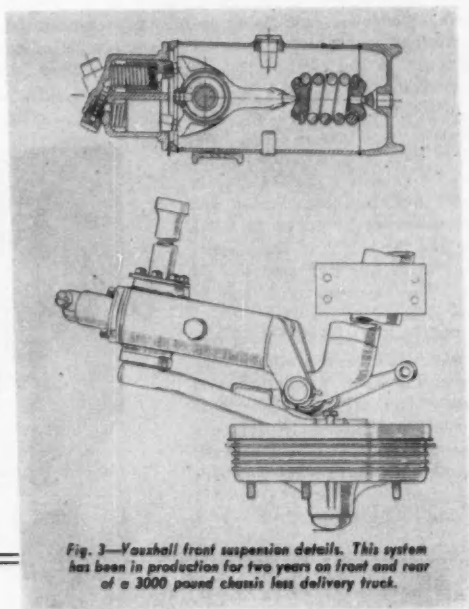


Fig. 3—Vauxhall front suspension details. This system has been in production for two years on front and rear of a 3000 pound chassis less delivery truck.

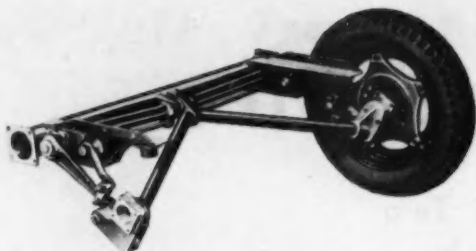


Fig. 4—Panhard rear suspension. The axle is a "V" tube pivoted at the frame cross member.

limited to Mercedes and Auto Union cars. In their final type Mercedes applied torsion bars at the rear, in conjunction with a De Dion type axle, with driving and braking torque reactions transmitted to the frame by two radius arms. On the 91½ cu-in. machine the torsion bars had a length of 33.2 in. and a diameter of 0.67 in. The surface was very highly finished, then copper plated. The bars were anchored to the frame immediately below the radius arm bracket at the forward end. The rear end passed through a curved lever and terminated in the reaction member of a piston-type shock absorber, which provided the necessary bearing point. The torsion bar was splined to both the curved lever and the reaction member of the shock absorber.

Dr. Porsche, designer of the rear engine Auto Union racing cars, adopted torsion bars at the front in conjunction with his two swinging parallel action trailing arms, the lower arm being splined to a torsion bar contained in the front tubular cross member of the frame. In the case of the 366 cu-in. machines, the torsion bars were 36.4 in. long and 0.632 in. in diameter, with suspension levers 3.73 in. long. This gave a progressive action with a rate of 1 in./344 lb. On later machines the torsion bar diameter was reduced to 0.553 in. and the length of the suspension arms was increased to 5.53 in. The unsprung mass was in the order of 132 lb.

Originally the Auto Union racing cars had quarter-elliptic rear springing, but with increased power and higher speeds, this was changed later to torsion bars and the De Dion type rear axle. On the 183 cu-in. cars the bars

had a length of 19.7 in. with a diameter of 0.868 in. The effective length of the torsion bar levers was 10.25 in., giving an overall plus or minus movement of 3.5 in.

Because of its engine location as well as its high power in relation to weight, the problems which had to be solved in designing a suspension system for Auto Union racing cars were somewhat different from those encountered in conventional passenger car design.

The suspension system adopted by the Bristol company features independent front wheels

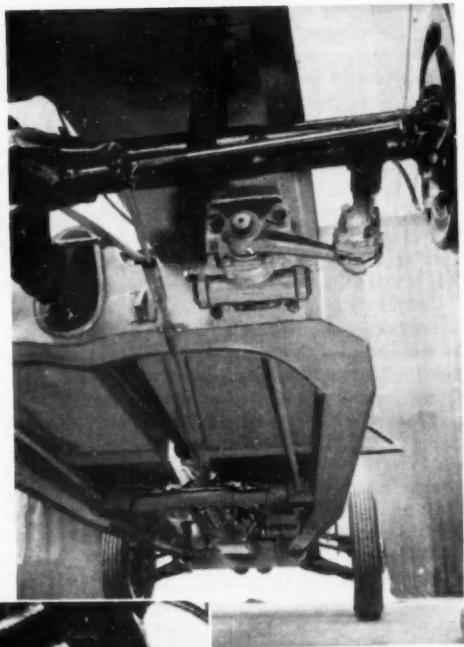
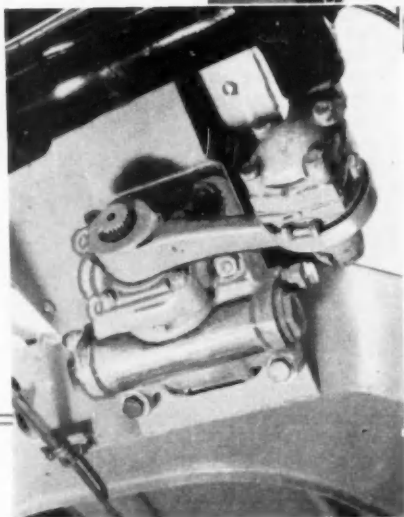


Fig. 5—View of the Bristol rear suspension from below. The long fore-and-aft torsion bars are attached to the shock absorber shafts and anchored to a cross tube of the chassis frame. Compensating toggle links are lubricated from the axle.



with a transverse spring and wishbone suspension arm anchorage. At the rear a normal type axle is used with Hotchkiss drive, the suspension being by two longitudinally placed torsion bars anchored at the forward end to a tubular frame cross member. Unsprung weight is reduced by the elimination of the center portion of the conventional semi-elliptic springs.

The rear ends of the torsion bars are coupled by a serrated fit to the mainshaft of the Bristol double-acting piston type shock absorbers, the operating levers of which also form the main weight-carrying radius arms for suspension. At the outer end of each arm is a ball joint provided with fore and aft adjustment for accurate alignment of the vehicle. The lower housing of each ball joint is carried at the lower end of a compensating toggle link pivoted at the axle housing tube.

The lateral forces and driving and braking road wheel torque are reacted by a centrally-placed V-shaped arm pivoted on two rubber-bushed joints on top of the rear cross member of the chassis frame. The axle is controlled by this member through the medium of a third ball joint located on the forward top face of the differential housing.

The bars have a maximum working stress of 90,000 psi. The front end of each bar has 25 serrations and the rear end 27, hence setting adjustment is on a vernier scale of 1.07 in. deg shock absorber arm angle stages, lifting the chassis by increments of only 0.15

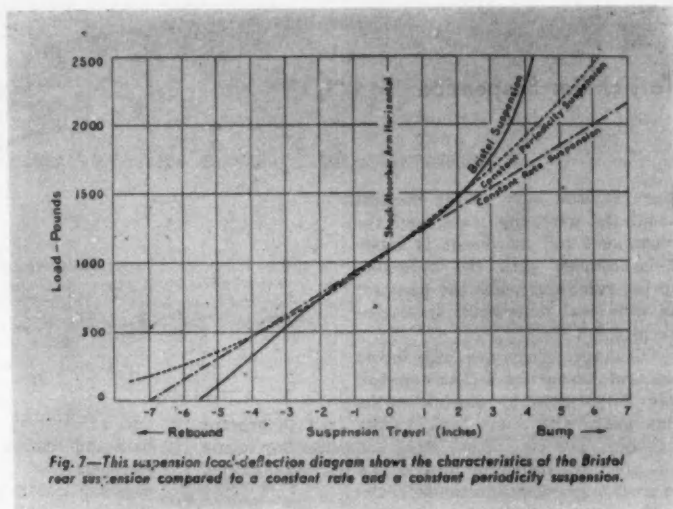


Fig. 7—This suspension load-deflection diagram shows the characteristics of the Bristol rear suspension compared to a constant rate and a constant periodicity suspension.

in. This method saves the unnecessary weight of an adjustment socket on the chassis.

An important feature is the variability of spring rate, the rate increasing towards the bump stop. During rolling action of the body the rate is increased even more than during parallel bumping. The shock absorber arm shortens its projected length according to the cosine of its attitude angle, and at the same time the compensating toggle link swings across, causing the load line to pass nearer to the fulcrum points, i.e., the center of the torsion bar (see Fig. 5).

During rolling action the axle swings about the lateral location point. The swing of the compensating toggle links is increased by this action, with the result that the roll rate increase is higher than that for the bump rate, with the obvious advantage that the roll of the body is reduced without hardening the ride (see Fig. 6).

The roll center for the rear axle is at the center of the ball joint on the top of the differential housing or approximately 4 in. above the center line of the axle. The front suspension has a roll center at ground level, and the roll axis passing between these two centers is therefore high, and the offset of the body center of gravity is small, hence

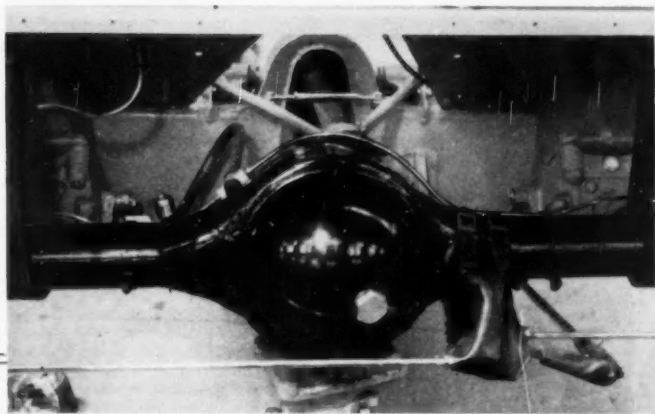


Fig. 6—Shown just above the rear axle housing of this Bristol suspension is the centrally-placed arm which takes braking and driving torque reaction.

## Torsion Bar Suspension

there is little body rolling moment about the unsprung mass, and the consequent roll movement is small. This, coupled with the stiffening spring rate, eliminates the need for an additional roll stabilizing mechanism.

The suspension system calls for no external lubrication. The top ball joint is lubricated by splash from the ring gear, with a synthetic rubber boot to prevent leakage. The two pivots of the compensating toggle link are lubricated from the axle, and the link is drilled to provide an oil way to the ball joint.

The German Volkswagen is equipped with torsion bar suspension at both front and rear. As illustrated, the front suspension is a trailing link type with flat steel strips serving as a torsion bar. While this arrangement is somewhat less efficient than a round bar of equal weight, it is inexpensive and compact. Two of these torsion bars are housed in cross tubes attached to the frame, each bar being fixed to the tube at the center with links attached at the outer ends of the bars. The links are attached also to the king pin supports to provide a parallel link arrangement which imparts only torsional movement to the bars. Stops on the cross tube bracket limit total motion on bump and rebound. Shock absorbers are direct-acting type. No adjustment is provided on the torsion bars.

Rear torsion bars are round in section with serrations at both ends and are enclosed in a tube which forms part of the chassis frame. The inner end of each bar is held in a bracket at the center of the tube

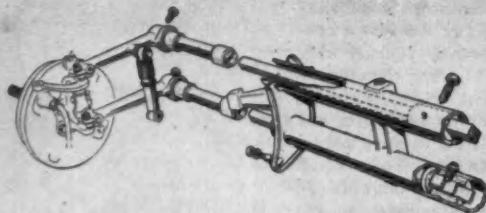


Fig. 8—Exploded view of Volkswagen front suspension.

and adjustment can be made only by removing the bars and reinstalling them in a different position in the serrations. Arms at the outer ends of the torsion bars are rigidly attached to swinging half-axle housings to serve as brake torque arms as well as torsion bar arms. These longitudinal arms are of built-up construction, each consisting of a pressed steel strip butt welded to a stamped steel boss at one end, the latter being serrated to fit the torsion bar. The opposite end is attached to the axle bracket by three bolts. Only one universal joint is used for each half axle, and only two bearings are necessary—one for each wheel. Brackets welded to the tubular cross member carry double acting shock absorbers of the detachable lever arm hydraulic type and are equipped with stops to limit torsional movement. Comparatively short torsion bars of large diameter are used so that the rear suspension is much stiffer than that at the front of the car.

A recent development by the Salter Company, one of the leading British spring makers, is the laminated torsion bar. This can be built up with the required number of leaves and, as in the case of the Chenard-

(Turn to page 88, please)

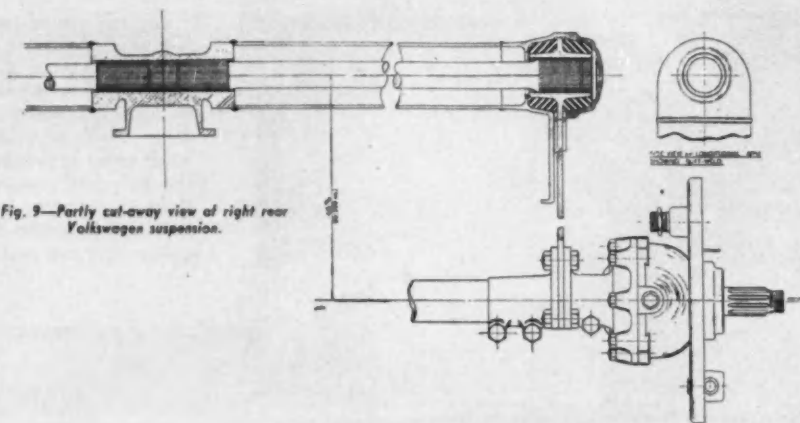


Fig. 9—Partly cut-away view of right rear Volkswagen suspension.

# Observations

By Joseph Geschelin

## Automatic Drives

It is possible now to summarize some of the features of automatic transmissions in regular production. Hydramatic still leads the field from the standpoint of application on various makes, including—Oldsmobile, Cadillac, Pontiac, Nash, Lincoln, and Kaiser-Frazer. Nevertheless, it is obvious that the hydraulic torque converter has gained acceptance and is represented in all new applications. Torque converter drives now are available on Buick, Chevrolet, Studebaker, and Packard, and will be found soon on Ford and Mercury. It is quite probable that the next model announcements for Cadillac and Chrysler Corp., will feature torque converter drives, at least according to well grounded rumors. At the present writing, Buick and Chevrolet have five-element, multi-phase converters while the rest have three-element converters. Packard, Buick, and Chevrolet use oil cooling while the Borg-Warner transmissions for Ford and Studebaker are air-cooled. Torque multiplication ranges from a minimum of 2 to 1, to a maximum of 2.5 to 1 at the present time. Among the automatic drives of other types still in production are the fluid drive transmissions on Chrysler Corp. cars; and the three-phase automatic drive supplied by Hudson.

## Waste Disposal

One of the aggravating problems facing industrial plants is the finding of an economical solution for the disposal of chemical waste products so as to eliminate stream pollution and break-down of modern systems of sewage. Many companies all over the country have taken steps to control waste disposal, and all such arrangements have been quite costly at the present time. One of the big headaches is to find means for breaking the emulsions incident to metal cutting. Emulsible oils for making cutting and grinding fluids are used to the tune of millions of gallons in automotive plants alone. Some of the emulsible materials when combined with certain local waters can be broken down at the time of disposal without too much expense or difficulty. Other combinations are extremely difficult to break up. This

problem deserves attention on the part of all research agencies including—the Federal Government, state and local government, industry, and the universities.

## Jeep and Weasel

It is a constant source of interest to this writer that two strictly wartime products—the Willys Jeep and the Studebaker Weasel—are so much in the news today. The Jeep requires no further comment but the Weasel, developed and built at Studebaker during the war years, is breaking into the news time and again. One example is its use in many rescue missions in the snow country.

## Mesabi Range Experiments

We have it on good authority that the Mesabi Range has become a proving ground for the application of heavy duty torque converters on the immense off-highway vehicles used for moving ore from the pits. Because of fixed and controllable operating conditions, the hydraulic torque converter can be used without mechanical transmission or gear multiplication. Although considerable development still remains before any of the drives can be termed acceptable, at least it can be said that the hydraulic torque converter offers for the first time a practical means of reducing shock load so destructive to mechanical drives. This experiment is well worth watching from the standpoint of vehicle designers and operators.

## Automatic Drives

The session on automatic transmissions at the SAE Annual Meeting gave promise of future developments in the direction of great simplification of mechanism. Simplification and still lower costs will ensure automatic drives on all makes of cars eventually. Some of our correspondence recently indicates that independent inventors have ideas for simple mechanisms based on hydraulic principles.

## Power Steer

One of the steering gear manufacturers has been experimenting with power steering for passenger cars for some time. They tell us that performance is just phenomenal—ease of parking and safety when encountering chuck holes or in the event of a blowout being the biggest talking points. Currently the price is estimated at about the same as that for an automatic transmission.

## Extreme Service

Some reports from abroad indicate that still greater air cleaning efficiency is required to protect heavy duty Diesel engines. Dust and dirt under extremes of operating conditions seem to work havoc with rings. The problem involves not only improvement in heavy duty oil bath air cleaners but in more adequate sealing of the entire induction system to meet these extreme conditions.

## Machine Tools

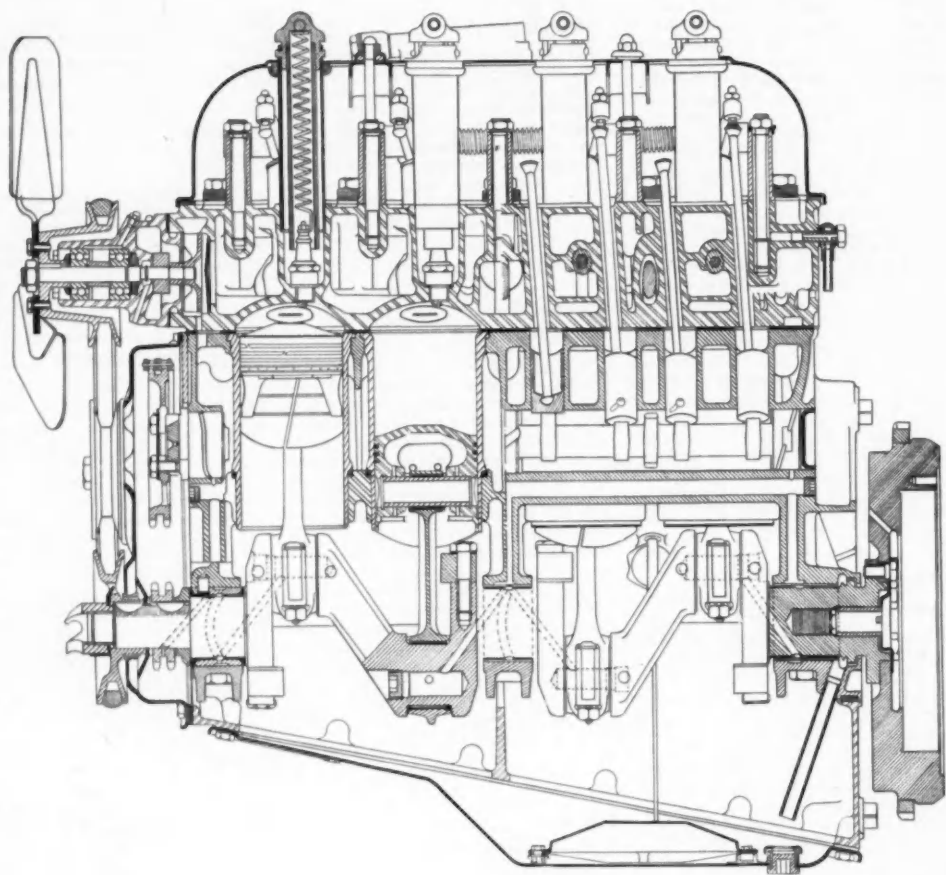
Despite some reports to contrary, many machine tool builders who have cast their lot with transfer machines and special machines for the automotive industries are reaping their just rewards. Much of this machinery is being installed in new plants and in new departments. It's going into new engine lines; and a tremendous amount of new equipment is on its way to new automatic transmission plants. Machine tool activity at the present moment is at a real high.

## Cutting Corners

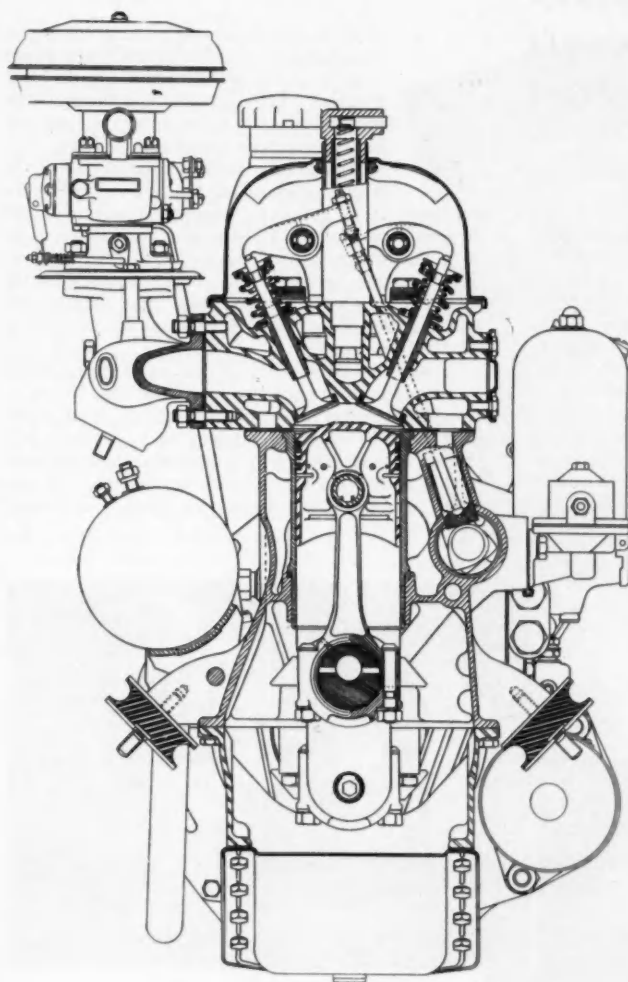
The making of forging dies for gas turbine blades for aircraft engines has assumed almost mass production proportions due to the rapid erosion of die elements. The special alloys required for modern jet engines make short work of the best die steels available. This problem has been met at Pratt & Whitney by the introduction of multiple-spindle Keller machines capable of producing in one setting from four to five copies off a master. This technique cuts labor cost to but a fraction of conventional practice.

# Peugeot Model 203

*The Model 203 Peugeot engine features short push rods to the overhead valves, made possible by the camshaft location high in the cylinder block. Cylinders have wet type liners and all valves have inserted seats.*



# Engine



## CONDENSED SPECIFICATIONS

Model .....	203
No. of cyls. ....	4
Bore (in.) .....	2.95
Stroke (in.) .....	2.87
Piston displacement (cu in.) ..	78.7
Compression ratio (to 1) .....	6.8
Max. hp .....	40 @ 4500 rpm
Piston material .....	Aluminum
Camshaft drive .....	Chain

# Aviation Tooling Adopted Aircooled

## *Twelve Cylinder Model is First to be Placed in Pro- duction at Continental's Large War-Built Plant*

**T**HE big war-built plant of Continental Motors Corp. at Muskegon, Mich., has been the scene of feverish activity incident to the tooling of the line of aircooled military engines described in *AUTOMOTIVE INDUSTRIES*, August 1, 1948. The first engine to be placed in production is the 12-cyl model.

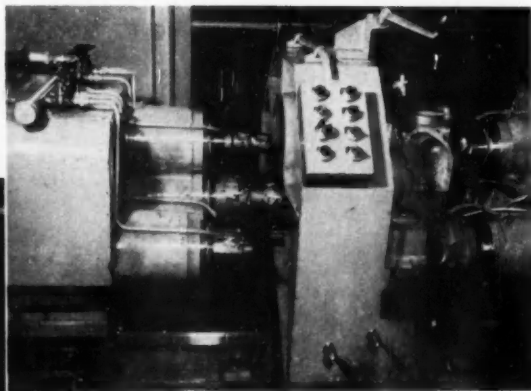
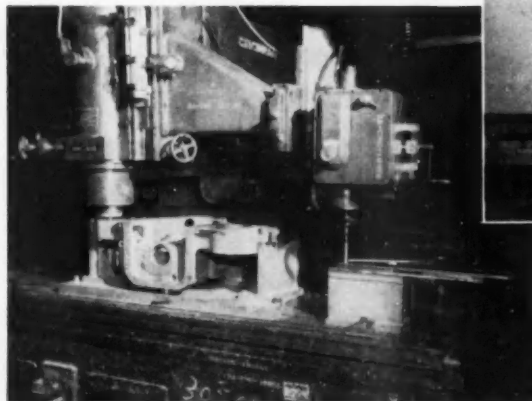
Distinguishing feature of this operation is its similarity with aircraft engine manufacturing practice. The emphasis on quality, on dimensional tolerances, on surface finish, and precision machining are all reminiscent of aircraft engine production during the war years. Since production volume is moderate there are no spectacular machining operations so far as cutting speed is concerned. Similarly, even the special equip-

ment is geared for moderate productivity, thus making it possible to index work pieces as much as two and four times in the same machine. Given greater volume the same operations would be handled in at least two machines or with transfer equipment.

This plant is tooled to machine all of the major elements of the engine and is so arranged as to physically separate non-ferrous and ferrous departments. Final engine assembly is done in a separate section of the building, isolated from manufacturing bays by a wall. This is a most effective means of preventing dirt and chips from entering the final assembly department where cleanliness is a factor of vital importance.

In selecting equipment for this plant every effort was made to utilize surplus government machinery so as to hold the cost to the military establishment to the most practical minimum. Consequently, a goodly percentage of machine tools is arsenal equipment suitably rebuilt and tooled for specific applications. At the same time the plant abounds in special machinery

*Below—One of the interesting operations on the accessory case is the profile face-milling of contact surfaces. As shown, this is done in a Cincinnati 28/60 vertical Hydro-Tel milling machine with 360 deg tracer control and four-position indicator stop.*



*Above—Close-up of work station of special Snyder two-way, 11-spindle boring machine on the accessory case which may be seen mounted on the right. The operations include: semi-finish bore, face, chamfer, etc., of all accessory and gear drive bores in front and rear sides of the case.*

# For Military Engines

designed and built to meet the requirements of many operations.

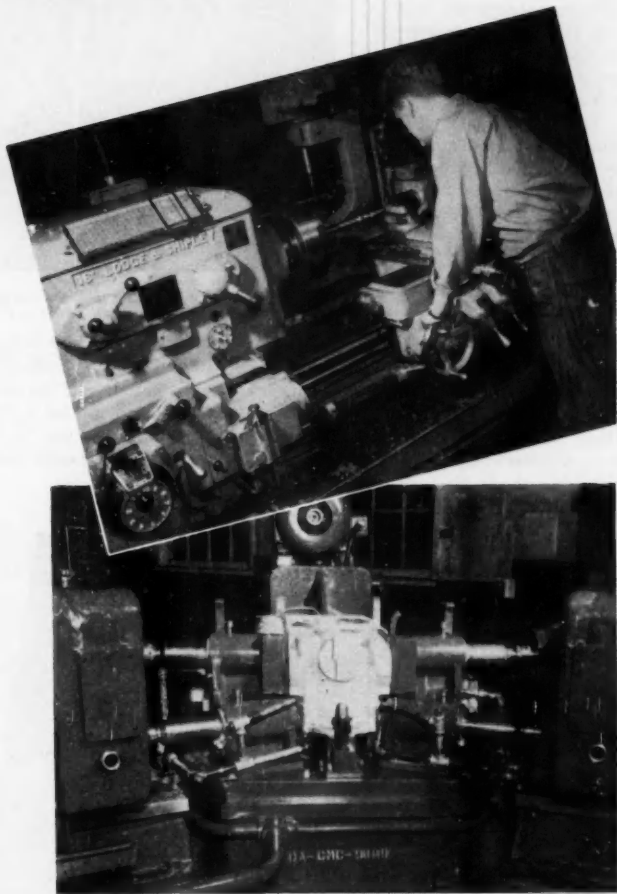
Taking into account the tremendous sweep of operations on many major parts the principal object of this article is to provide a perspective of the plant through a sampling of unusual operations and primarily of those operations that required special machinery.

One example is the accessory case, an aluminum alloy casting which is one of the most intricately finished parts of the entire assembly, requiring precision machinery at every step. All major castings such as the accessory case, crankcase, oil pan, etc., are inspected in the rough in target fixtures where they are aligned with respect to important locating points. On the accessory case two locator holes are drilled in ears on the casting to preserve alignment in machine fixtures.

Among the salvaged equipment is a battery of nine large 28 in. Series Cincinnati Hydro-Tel milling machines which were used so widely in war production. Several of these, with 360 deg tracer control, are employed for milling the sides of the accessory case and particularly for milling bosses and pads to template. In addition, Cincinnati has supplied one of its new 16 in. by 30 in. Hydro-Tel machines. This machine has an extended nose cutter for reaching into the face of the case to mill the outline of a flange on each side and thrust buttons inside the flange. Milling is done in four separate steps with the cutter guided by a template. Control of the steps is accomplished by means of a four-position turret stop, each one being brought into position by the operator at the completion of each cycle.

Rough boring of the case is done in a special five-head, W. F. & John Barnes machine, using the two locator holes for alignment in the fixture. Rough boring of front and rear bores is done in an enormous two-way Snyder machine having 11 boring spindles, five on one side, six on the other.

Following roughing operations, the two locator holes are precision bored in an Ex-Cell-O in two stages—semi- and finish-bore—into which are assembled hardened locator pins to provide a precision location for



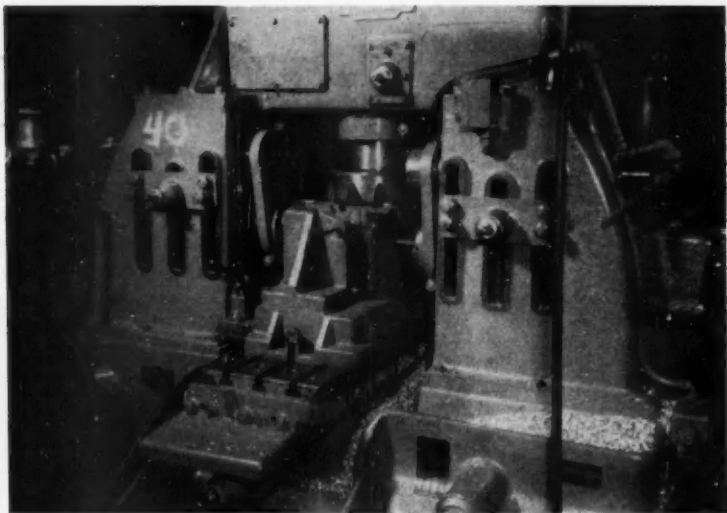
*Top—This versatile 16 by 54-in. Lodge & Shipley Model X engine lathe has been fitted with a "Copymatic" attachment for the automatic contour-turning, facing, chamfering, etc., of miscellaneous shafts and shaft gears.*

*Bottom—A major operation on the accessory case is the semi-finish bore, face, chamfer, etc., of the five accessory and drive gear bores. This is done in one setting in the special W. F. & John Barnes five-head horizontal boring machine illustrated here.*

## Aviation Tooling

finish-machining. Then after boring in a Snyder machine, the same bores are precision-bored to fine tolerance in a big Ex-Cell-O two-way machine fitted with ten spindles.

The crankcase, an aluminum alloy casting, easily the largest piece of the assembly, is fitted in a target fixture and located for installation in machine fixtures by filing a set of lugs to suit the alignment. First operation is on a Cincinnati Hydro-Tel fitted with a combination cutter which mills the oil pan face with the lower cutter in two operations; then mills the inner bosses and main bearing cap faces in two settings. This operation removes about  $\frac{3}{8}$  in. of metal with a cutter speed of 708 fpm.

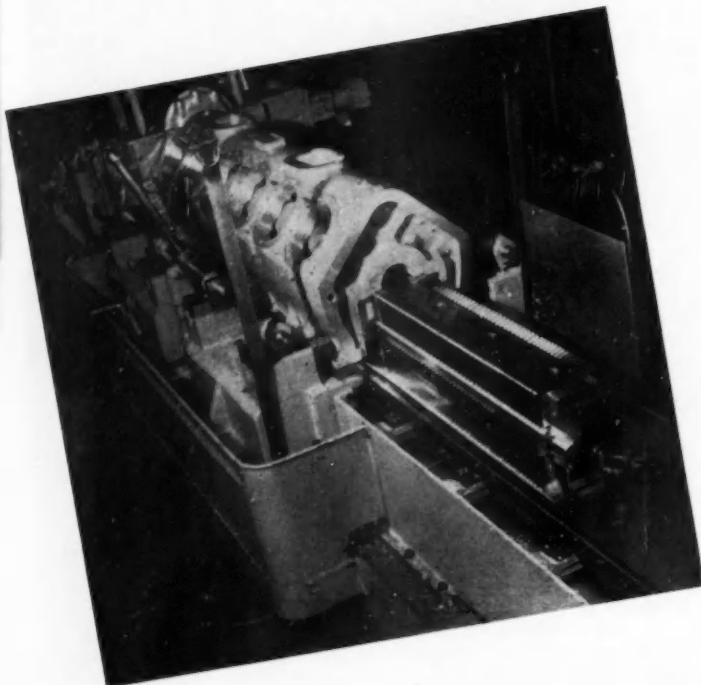


*In this view may be seen the milling of cylinder head exhaust and intake port pads and top cover contact face in a single setting in the Kearney & Trecker Triplex milling machine.*

Another Hydro-Tel is set up for milling the top face and the two inclined cylinder decks in three operations, using a three-position indexing fixture. This is followed by rough-boring of cylinder bores in a three-spindle Ex-Cell-O precision boring machine. On the

12-cyl case it takes two indexings to rough-bore the six bores on one side, the operation being repeated on the other side by rotating the fixture by 90 deg. The operation removes from  $\frac{1}{4}$  to  $\frac{3}{8}$ -in. of stock on each side.

One of the new machines installed on this line is a Cincinnati Triplex mill for finish-milling the top face and cylinder decks after roughing. Another special Snyder machine is used for drilling, counterboring, and tapping the bolt circles on the cylinder deck. It has three clusters of 14 spindles on each side, and requires progressive movement of the case to complete the operations on each of the six bores on each side.



*Among the many detail operations on the crankcase is the one shown—the finish-broaching of bearing cap channels and inner faces of cross bolt bosses. The operation is performed in this enormous Model HAS-15-90 Colonial horizontal surface broaching machine.*

3

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4



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This "new arithmetic in steel" is in step with industry's trend to the use of improved steels. When cold-rolled steel was found to be preferable to hot-rolled for many uses, industry substituted cold-rolled for hot in these uses. Today, it is equally logical and economical to replace simple carbon sheets with low-alloy high-tensile.

N-A-X HIGH-TENSILE makes it possible to reduce sections by 25% ... and *still provide* greater strength and durability than can be obtained with thicker sections of mild-carbon steel! Each ton of N-A-X HIGH-TENSILE steel represents a potential 33% increase in finished goods. Manufacturers are finding that N-A-X HIGH-TENSILE enables them to get 33% greater usefulness out of steel supplies.

Investigate this great opportunity to make each ton of sheet steel go farther ... through the superior quality of N-A-X HIGH-TENSILE.

## Aviation Tooling for Military Engines

It is of interest to note that tapped holes are specified for Class 3 fits.

Illustrated is a big horizontal Colonial broaching machine for finish sizing the bearing cap slots and bosses in the main bearing line. This is done in one pass of the massive slab broach, removing about 1/32 in. of metal on each side. The broach is rated at 15-ton capacity, has a ram stroke of 90 in.

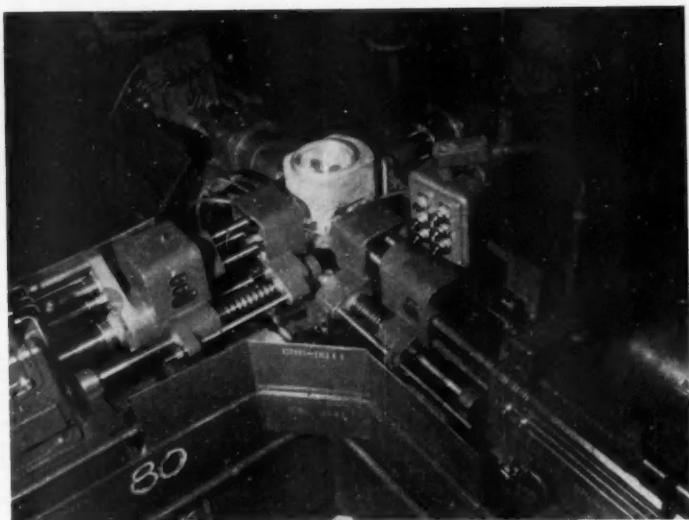
A specially designed Cincinnati rise-and-fall type milling machine with a set of 20 milling cutters on the bar is used for straddle-milling main bearing sides, and milling bearing lock slots.

An excellent example of multiple - staging machine cycles to conserve equipment cost is found in the special Snyder for drilling, counterboring, countersinking, reaming and tapping both ends of the crankcase. It is a two-way machine with four stations on each side, the work being moved progressively through four positions. It is fitted with a total of about 131 spindles, with sub-land drills.

An extensive cylinder head line features several pieces of equipment of real interest. One of these is a Milwaukee mill of triplex type having three heads, the vertical spindle cutter being about 12-in. in diameter. It is set up for milling the top face and exhaust and intake port pads. The operation is fast, table movement being at the rate of 25 ipm. An-

other special machine is a large four-way Buhr unit with Ex-Cell-O heads for drilling and counterboring all holes in four sides. The job is completed in two positions of the fixture. Tapping of all holes, following this operation, is handled in a Cross tapping machine with work presented in two positions.

One feature of interest to production men is that the now well-known Cimcool cutting fluid is being employed extensively throughout the machine shops. About 50 per cent of all operations employ Cimcool at the present time.



A unique operation on the cylinder head is the drilling and counterboring of holes in four sides. This view is taken looking down on the work fixture of a special Buhr four-way horizontal 24-spindle drilling and counterboring machine. One of its features is a two-position vertical index.

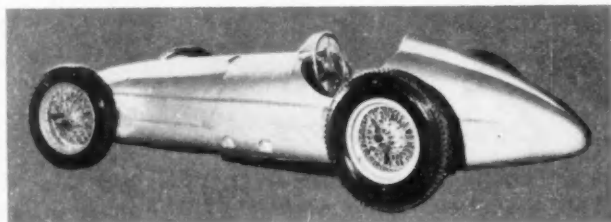
## New British Racer Has Super Speed Engine

ENGLAND'S national racing car, designed and produced by the British Motor Racing Research Trust, with the active support, either in money or material, of about 160 automotive firms, has just been uncovered and run in public. A sum of about \$500,000 was spent in its construction, but considerably more will be required before this prototype and the two others in preparation are ready for racing.

Its V-16 engine of 9½ cu. in. has two overhead camshafts for each bank of cylinders, and is said to peak at 12,000 rpm, with a power output of 400 hp. The claim has been made that the engine would run as high as 16,000

rpm, but it is maintained that it can operate continuously at between 7000 and 10,000 rpm. Cylinders have a bore of 1.95 in., with a piston stroke of 1.90 in.

(Turn to page 100, please)



# **TORRINGTON NEEDLE BEARINGS**

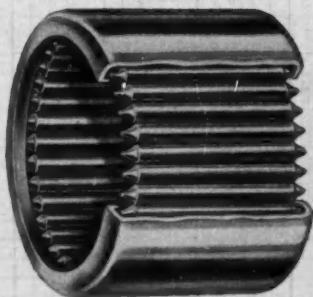
**give maximum  
load distribution**



Torrington Needle Bearings distribute radial loads over a greater bearing area than any other type of anti-friction bearing of comparable size.

This unique engineering feature of Torrington Needle Bearings assures maximum load capacity for any given housing or shaft size.

Where you encounter high load conditions with fixed or rigid space limitations, you will find the Torrington Needle Bearing specially engineered to give you this and other important advantages. Why not discuss your problem with our engineers? They'll be glad to help you.



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# **TORRINGTON *NEEDLE* BEARINGS**

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# Publications

## AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### H-38 Steels for Use At High Temperatures

United States Steel Corp. — A new 87-page, illustrated booklet, "Steels for Elevated Temperature Service," available through Carnegie - Illinois Steel Corp., Pittsburgh, Pa., for the use of those interested in the design of jet engines, rockets, and gas turbines.

### H-39 High Speed Synchronous Electric Motors

General Electric Co.—An eight-page, two color bulletin on Tri-Clad high speed synchronous motors. Designated as publication GEA-5426, it lists some of the applications for these motors, such as driving pumps, grinders, compressors, saws, fans, generators, conveyors, mixers, etc. Profusely illustrated, the bulletin describes Tri-Clad protection, and discusses construction features, mechanical modifications, and direct-connected exciters for the motors.

### H-40 High Speed Diesel Engines

Cummins Engine Co., Inc. — Sixty-eight high speed Diesels for automotive, industrial and marine applications, covering the power range from 50 to 550 hp, and three medium-speed Diesels, are described in Bulletin No. 5218C, a new 36-page condensed catalog. The catalog lists for the first time 27 new Cummins models introduced within the last 12 months.

### H-41 Resistance Welding Control Equipment

Westinghouse Electric Corp. — Electronic resistance welding control equipment, both synchronous and non-synchronous, is described in detail in booklet B-4309. Basic equipment in the control circuit includes a sequence-weld-timer panel and a means to fire the ignitron tubes in the power circuit. Auxiliary control panels can be readily added to meet specific job requirements. This booklet lists and discusses the

functions of both basic and auxiliary control panels.

### H-42 Care of Bearings

The Anti-Friction Bearing Distributors' Association — A 20-page booklet titled "Installation, Maintenance, Removal of Anti-Friction Bearings." It is profusely illustrated throughout, and gives detailed information on the subjects of bearing types, cleaning bearings, removing bearings, installation, lubrication, and tips on how to handle and prepare bearings for storage.

### H-43 Right Angle Gear Unit

Airborne Accessories Corp.—A four-page bulletin describing the latest improved model Anglegear, right angle gear unit recently redesigned for universal mounting. The standard unit is rated at 250 in. lb static torque capacity or to transmit 1/3 hp at 1800 rpm continuous duty. As an optional extra units can be furnished with 500 in. lb static torque rating.

### H-44 Heat Exchangers

Young Radiator Co.—An illustrated eight-page bulletin "Shell and Tube Heat Exchangers by Young" describes the Company's heat exchangers which are adaptable to a wide variety of heat transfer applications; engine oil and jacket water; oil cooling for bearings, machine tools, reduction gears, transformers, generator sets and similar applications; and miscellaneous fluid cooling such as salt or fresh water.

(Turn to page 102, please)



THIS TIME SAVER COUPON is for your convenience in obtaining, WITHOUT OBLIGATION, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on other pages.

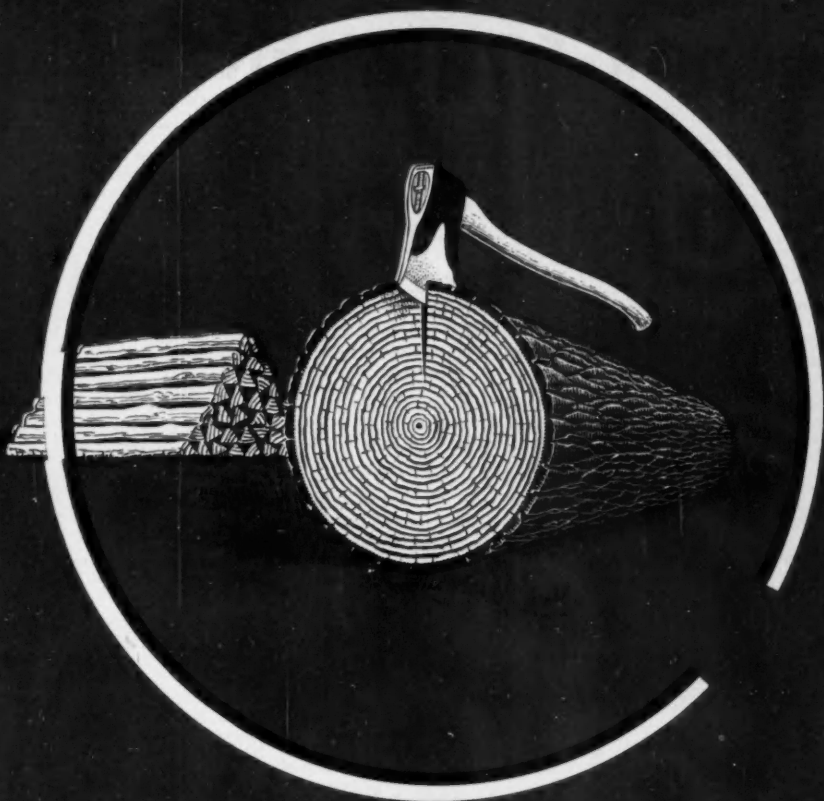
Readers' Service Department,  
Automotive Industries,  
Chestnut & 56th Sts., Philadelphia 39, Pa.

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Since 1911, it has been a Sealed Power custom to carry out every commitment to the unqualified best of our ability. This characterizing with the unexcelled quality of our products and the skillful men, the kind of Power of the Head of the Field — has made today's Sealed Power staff, machines, and laboratories the finest in our history. You are invited to use the products of these facilities to help make your good engines even better.

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MUSKOGEE, ALABAMA



# Sealed Power

PISTON RINGS | PISTONS  
CYLINDER SLEEVES

# NEW • PRODUCTION • EQUIPMENT • PLANT •

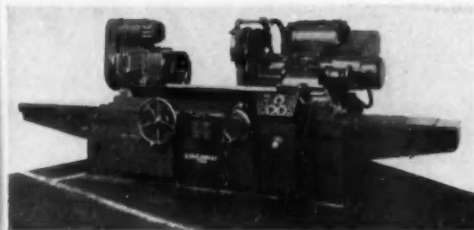
FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

## J-23—Plain Grinding Machine

For grinding medium to large sized parts, the new Cincinnati Filmatic 14 in. and 16 in. plain grinding machines, announced by Cincinnati Grinders Inc., Cincinnati, Ohio, provide a grinding wheel spindle running on Filmatic bearings. Bearings consist of multiple segments, fixed axially but free to

is also a function of the electrical system.

The headstock is a dead spindle, d-c motor driven unit, having a No. 13 B & S taper hole in the spindle. The unit has a very long bearing on the table, approximately equal to entire length of the headstock casting. Spindle speeds are rheostat controlled, infinitely variable from 40 to 144 rpm for the 14 in. machine, and 20 to 72 rpm for the 16 in. machine. Matched V-belts



Cincinnati Filmatic 16 in. by 36 in. plain grinding machine

rock radially a slight amount. Immediately upon rotation of the spindle, wedge-shaped oil films are formed between the segments and spindle diam. They build up to high pressures and automatically adjust themselves to variations in forces created by the grinding action.

Lubrication of Filmatic bearings is automatic, with circulating filtered oil. Lubrication precedes spindle rotation, and initiates the starting thereof through a pressure switch. Should the lubricating system fail, the grinding wheel drive motor automatically stops.

The table is traversed by means of a rack and pinion and a simple drive from the motor. Traverse rates are infinitely variable between 3 in. and 120 in. per min, through a d-c motor controlled electronically from an a-c source. This type of drive is stated to offer a smoothness and flexibility comparable to hydraulic traverse.

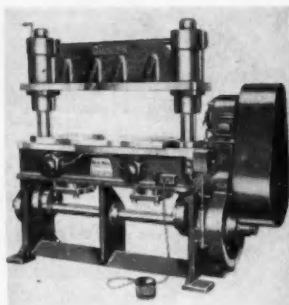
The electrical system provides automatic acceleration and deceleration of the table at reversal, thereby eliminating shock. In addition, tarry at each end of the table stroke can be independently adjusted for a time delay of zero to about 18 seconds. Coolant flow and headstock spindle rotation can be stopped and started independently, or in unison with the table traverse. This

and precision silent chain smoothly transmit power from motor to the face plate.

Tinning, strip mill, foil, precious metal and similar cambered rolls can be ground on these machines when equipped with swivel table type roll cambering mechanism. Power cross feed to the wheelhead is also available for roll grinding operations or any other work requiring frequent and lengthy, cross traverse movements.

## J-24—Double Crank Punch Press

A model 3036 Multi-Max punch press has been added to the line of double crank large bolster area punch presses, manufactured by the Diamond Machine Tool Co., Los Angeles, Calif. Rated at 30 tons capacity, it combines a large bolster area of 16 by 36 in. and a ram area of 10 by 36 in., providing 80 strokes per min for a variety of metal stamping operations. The illustration shows installation of two 8 in. pneumatic draw die cushions and an electrically operated solenoid clutch mechanism having hand operated push button safety switches and remote control foot switch. The Multi-Max punch

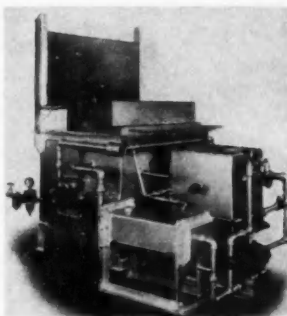


Diamond Multi-Max double crank punch press, model 303c

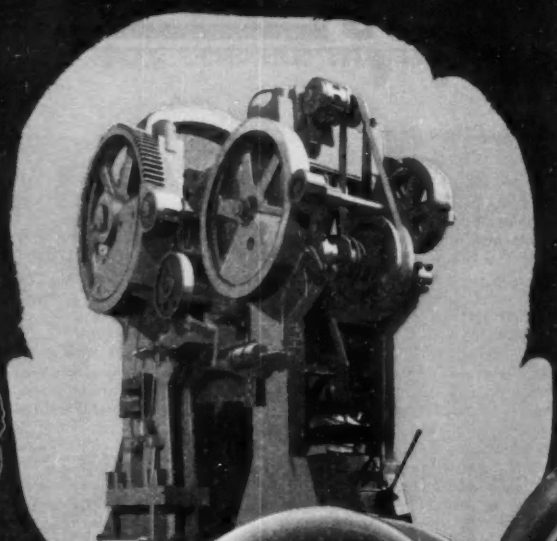
press is of all steel weld construction with a 4-point engaging clutch. Standard stroke is 2 in.; maximum stroke to order is 4 in. Standard shut die height is 10 in. with maximum to order 24 in. Ram adjustment is 2 in. The press is single geared with precision herringbone gear design. Crankshaft is 3 in. in diam, heat treated, ground, and highly polished. Motor required is 3 hp, 1800 rpm.

## J-25—Vertical Slot Forge Furnace

The Lithium atmosphere vertical slot forge furnace produced by the Lithium Co., Newark, N. J., provides protection up to 2400 F against scaling during (Turn to page 64, please)



Lithium atmosphere vertical slot forge furnace



symbol of **Know How** for over 40 years

**KELSEY-HAYES WHEEL COMPANY PLANTS:**

• Detroit, Kelsey-Hayes Plant in Michigan  
 • McKeesport, Pennsylvania • Decatur, Iowa  
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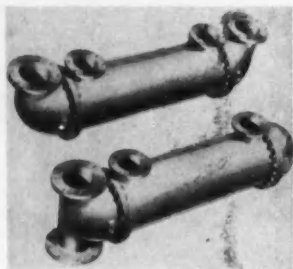


# NEW PRODUCTS

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

## K-47—Redesigned Heat Exchangers

Expanding its redesigned line of heat exchangers, Young Radiator Co., Racine, Wis., announces its new Type R (removable tube bundle) shell and tube heat exchangers. The line consists of both single and two-pass models in a wide range of capacities. Standardi-



Young type "R" removable tube bundle type shell and tube heat exchangers. Above: single pass style. Below: two-pass style.

zation is said to offer exceptional savings by quicker delivery, and low original and maintenance costs.

Young Type R heat exchangers are of corrosion-resistant Admiralty metal tubing. Larger tube sizes— $\frac{1}{2}$  in. OD and  $\frac{3}{4}$  in. OD—plus engineered tube spacing and baffling, provide longer unit life, easier maintenance, and maximum heat transfer efficiency.

The units have been especially designed for engine cooling—engine jacket water and lube oil; oil cooling—bearings, machine tools, reduction gears, pumping units, turbines, cutting oil, quenching oil, transformers, industrial hydraulic equipment, generator sets, etc.; miscellaneous fluid cooling—fresh water, salt water, torque converter fluid for power cranes, buses, trucks, etc.

## K-48—High Tensile Castings

The Chambersburg Engineering Co., Chambersburg, Pa., is producing large and small castings of Ductile Cecolloy for component parts of many types of Chambersburg forging equipment, and

is also marketing the material in the heavy jobbing casting field. Castings up to 40,000 lbs., possessing high tensile strength, a substantial amount of ductility with a high yield strength and high elastic modulus, have been produced.

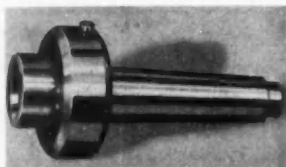
Basically the material is a high-carbon cast iron, treated with magnesium to transform the graphite from the normal flake form to spheroidal form, thus retaining self-lubricating properties and much of the vibration-dampening properties of cast iron, while virtually eliminating the inherent weakness of normal cast iron which results from the notch effect of flake graphite. The metallic matrix of the material is essentially steel, which can be produced with appropriate microstructures to give desired physical properties. It is also subject to heat treatment for alteration and improvement of physical properties.

Ductile Cecolloy can be produced to specifications within the ranges of the following physical properties as cast: tensile strength 60,000 to 80,000 psi; yield strength 40,000 to 60,000 psi; elongation 0 to 15 per cent; modulus of elasticity 22,000,000 to 25,000,000 psi.

Although higher in cost than cast iron, Ductile Cecolloy is lower in cost than cast steel. Weight reduction made possible by its high strengths will in many cases result in economies over cast iron construction, the company declares, and further economies will result from its substitution for cast steel where physical properties permit.

## K-49—Female Live Center

Female live center for supporting centerless shafts is available in two sizes from the South Bend Lathe Works, South Bend, Ind. One size pro-



Live center for centerless shafts

vides a No. 3 Morse taper shank and maximum works capacity of 1 in.; the other a No. 2 Morse taper shank and  $\frac{3}{4}$  in. work capacity. Both sizes take work diameters down to 5/16 in. The revolving center is made from electric furnace steel heat treated to a hardness of 61 to 65 Rockwell C. Center shaft extends through the taper shank and is rigidly supported at both ends. A precision ball bearing carries both the radial and thrust loads of the work; a plain pilot bearing eliminates center shaft whip.

## K-50—Portable Radiation Detector

Enabling the operator to measure radio-activity from a distance, a port-



G-E portable radiation detector, the long-probe Gamma Survey Meter, in use monitoring a laboratory safe containing radioactive isotopes which are enclosed in a heavy metal canister and surrounded by lead bars to prevent possible radiation.

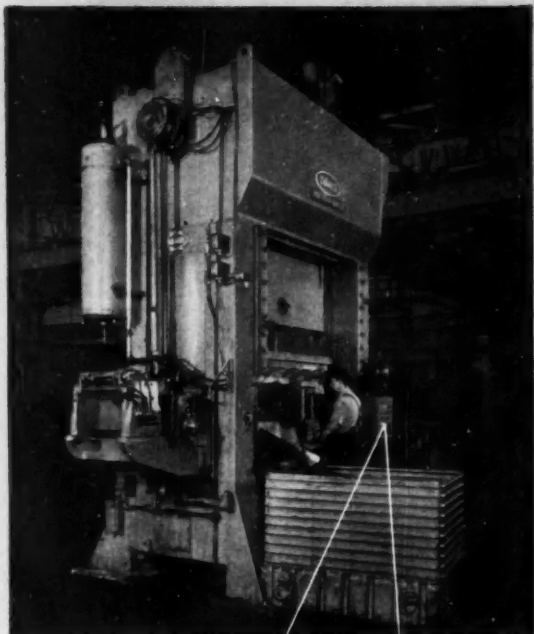
able radiation detector, the long-probe Gamma Survey Meter has been announced by the Special Products Division of the General Electric Co., Schenectady, N. Y., for use in monitoring areas in which radioactivity is suspected, or for other types of radiation metering.

A detector located at the tip of a four-foot-long probe converts radioactive emanations into electrical energy. This detector consists of an electronic tube and a phosphor, a material which

**50% LONGER DIE LIFE ON THIS**

# DANLY

## autofeed



Higher speed of this DANLY AUTOFEED PRESS made a 50% increase in die life possible!

### 50,000 parking lamp mounting brackets stamped before die change!

Presses work hard in this large automotive plant . . . shift averages up to 7500 pieces are achieved on this Danly Autofeed! Notching, flanging, trimming, piercing and cut off operations are performed on each stroke of the press.

Variable and higher speed of the Danly Autofeed Press on this job is the key factor in making this remarkable die life improvement possible. Experimentation with various operating rates showed that higher speeds meant 50% longer die life. Higher speeds are possible with Danly Autofeed Presses because of heavier construction and greater resistance to vibration and deflection.

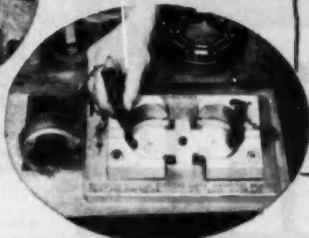
But this significant advantage is only one of the cost reducing features of Danly Autofeed Presses. For another, the new Danly cool-running clutch greatly reduces the most important single item of press operating cost, clutch maintenance.

Danly Autofeed Presses are available from 50 to 800 tons, offering the advantages of automatic feeding over a greatly expanded tonnage range.



Close up of the die setup. Two finished pieces, one right and one left, are produced per stroke.

View of inspection operation showing precision gaging of the parking lamp mounting brackets produced.



#### SEND FOR THIS FREE BOOKLET

And see how DANLY AUTOFEED PRESSES are certain to reduce stamping costs in your plant!



#### CHECK THESE

#### EXCLUSIVE DANLY PRESS FEATURES

- ✓ cool-running clutch
- ✓ extra rigidity
- ✓ complete pressure lubrication
- ✓ special controls—sensitive reaction
- ✓ precision construction

Danly Machine Specialties, Inc., 2100 South 52nd Avenue, Chicago 50, Illinois

MECHANICAL PRESSES...50 TO 3000 TONS



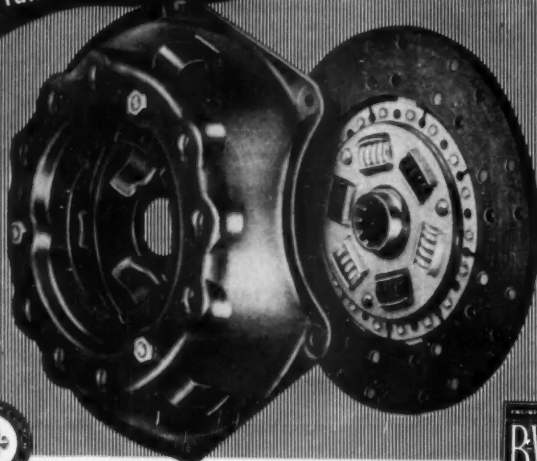
# NEW PRODUCTS

gives off light in the presence of radio-activity. Light from the phosphor acts upon the electronic tube, which converts the light energy into electrical energy and amplifies its magnitude.

At the other end of the instrument, a dial is activated by amplified energy

from the tube. It registers the amount of radiation exciting the phosphor four feet away. The detector is powered by 1,000 volts induced from low-voltage batteries, which are enclosed in a box that can be carried over the operator's shoulder.

**Engineered by Borg & Beck**  
means . . . built to the exacting standards  
which have made the name BORG & BECK  
famous for 36 years!



*You can depend on-*

# BORG & BECK

FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD!

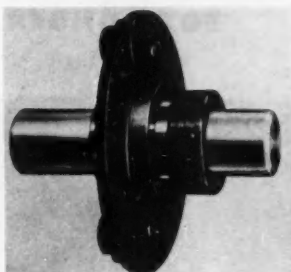
**BORG & BECK DIVISION**

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**CHICAGO 38, ILLINOIS**

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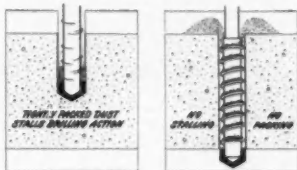
## K-51—Power Transmission Unit



Complete ball bearing power transmission unit called the Flangette. Designed primarily for light duty, slow speed anti-friction bearing applications, this product of the Fafnir Bearing Co., New Britain, Conn., is a simple arrangement of two pressed steel stampings to form an inexpensive flanged housing enclosing a standard Fafnir self-aligning wide inner ring type ball bearing. The Flangette is available for shafts of 18 sizes ranging from one-half in. to 2-3/16 in. Intended primarily for the agricultural implement field, it is expected to find uses in such lines as light duty conveyors, dryers, tumbling barrels, etc.

## K-52—"Live-Spiral" Carbide Drill

The idea of the Carboloy Co., Detroit, Mich., in applying high tensile wire to form a "live-spiral" flute on the shank of a carbide masonry drill promises to alter, simplify and reduce time and cost in the drilling of holes in masonry, brick, tile, concrete and similar hard materials, it is said. Not only does the



(Left) Conventional carbide masonry drills drill to depth of about three diameters of tip before loading up. (Right) New Carboloy "live-spiral" drill with carbide tip goes all the way without packing, cleans dust from hole as it drills continuously, faster, easier, deeper.

new carbide tipped drill cut faster, but it keeps right on going deeper with greater ease than with conventional types of drills, the company reports. There is no necessity for withdrawing the drill to remove dust from the hole because the "live-spiral" flute cleans the hole while the hole is being drilled.

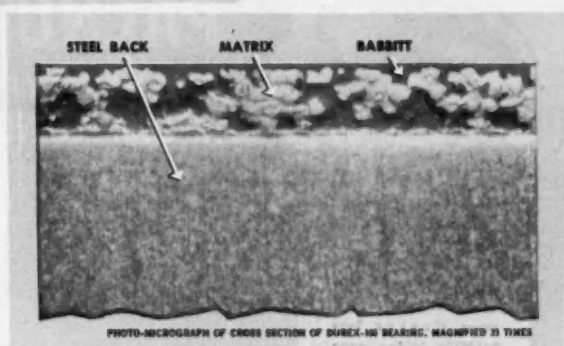
(Turn to page 72, please)



# DUREX-100 ENGINE BEARINGS

*Have built-in Stamina*

More and more, as engines go to higher and higher compression ratios—and higher bearing loads—Durex-100 bearings are proving their extra ability to stand up on the job. This extra endurance, combining extraordinary conformability, embedability, and resistance to corrosion and fatigue cracking, is built into the bearing—layer by layer. To the steel back is sintered a layer of copper-nickel powders, which form a porous matrix firmly brazed to the steel. Then a thin overlay is cast of a special corrosion-resistant high-lead babbitt, which penetrates the porous matrix and bonds mechanically, as well as metallurgically, to the steel-backed matrix.



## THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically with thin high lead babbitt overlay.

Durex-100 engine bearings, as original equipment in Cadillac, Buick, Oldsmobile, and GMC, and other automobiles and trucks, are proving their superior fitness for use in the modern high-compression engine. Inquiries are invited regarding the advantages of Durex-100 bearings for engines of your manufacture.

**MORaine PRODUCTS DIVISION OF GENERAL MOTORS**  
**DAYTON, OHIO**

**DUREX-100 ENGINE BEARINGS . . . BY MORaine**

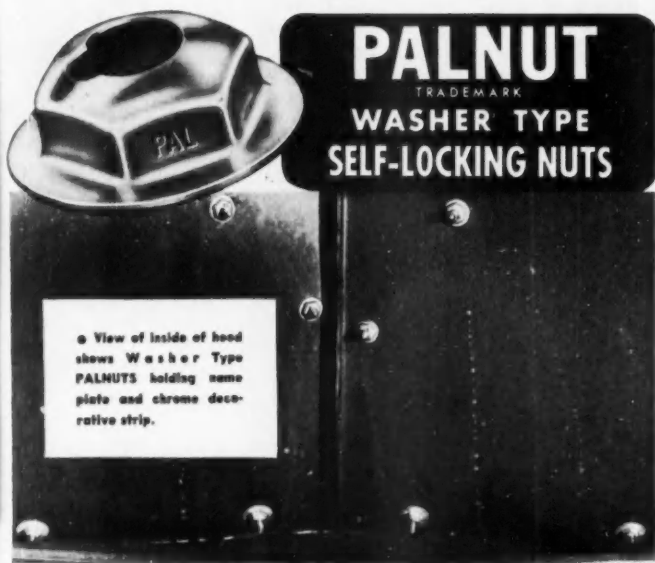
(Continued from page 58)

heating steel for forging or pressing, annealing or brazing ends or sections of bars, band heating, etc., while requiring no need for special prepared atmospheres. The slight coating of

Lithium imparted to the work during these heating operations further prevents secondary oxidation to 2200 F during the cooling down period in transferring work from furnace to forging hammer, press or upsetter, or while cooling after hot working.

## Low-cost, vibration-proof fastening

of Hood and Trunk Medallions, Moulding Strips,  
Tail and Parking Lights, etc.

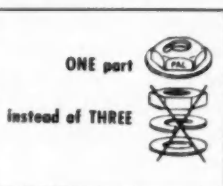


• View of inside of hood shows Washer Type PALNUTS holding name plate and chrome decorative strip.

**"75% reduction in assembly costs"**  
reports one manufacturer

Inexpensive, one-piece Washer Type PALNUTS perform the same function as an ordinary nut, lockwasher and plain washer combined. You not only save on parts and handling operations, but power drivers may be used to further speed up assembly. PALNUT double-locking action holds tight under vibration. Built-in washer spans holes and slots.

Send details of your assembly for samples. Ask for Bulletin 570 giving data and dimensions on Washer Type PALNUTS.



**THE PALNUT COMPANY**  
60 Cordier St.  
Irvington 11, N. J.  
Detroit: 8100 Lyndon Ave.

**MILLIONS OF PALNUTS USED MONTHLY BY AUTOMOTIVE MANUFACTURERS**

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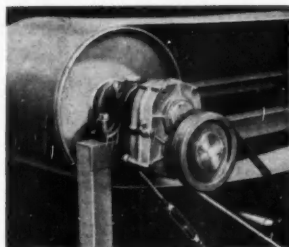
The Lithium vaporizing chamber, built integrally with the furnace, is a refractory lined steel shell provided with gas burners or electric heaters. The chamber contains a tubular Lithium vaporizer in which a cartridge of Lithium compound is vaporized by its own gas or electric heating equipment. The products of combustion which go through a precooling and condenser, are used as the carrier gas. These are recirculated through the Lithium vaporizing tube, picking up vaporized Li for introduction into the furnace.

The heavy duty furnace contains a shell of welded steel plate, mounted on legs and lined with 4½ in. of hard burned brick backed up by sufficient refractory insulating brick. Automatically controlled oil or gas burners fire directly into the combustion chamber, producing high thermal heads. Heating is rapid with minimum heat loss through walls. The charging side of the furnace is not only fully shielded, but contains a perforated pipe to provide an air curtain for protecting the worker against heat radiation and discomfort.

Furnaces are available in single and double slot types. In both types of furnaces, the refractory tiles are adjustable to alter the working opening and slot depth for pieces of varying size or for band heating.

### J-26—Speed Reducer

Newest addition to the line of power transmission equipment of the Dodge Mfg. Corp., Mishawaka, Ind., bearing the name Torque-Arm speed reducer, mounts directly on the shaft to be



Dodge Torque-Arm speed reducer

driven and is designed primarily for conveyors, bucket elevators, agitators, mixers, feeders, processors, etc.

The unit consists of a reducer with a fixed ratio of 15 to 1, driven by a motor through any V-belt or flat belt drive. Any desired output speed from 13 to 133 rpm can be obtained through (Turn to page 67, please)

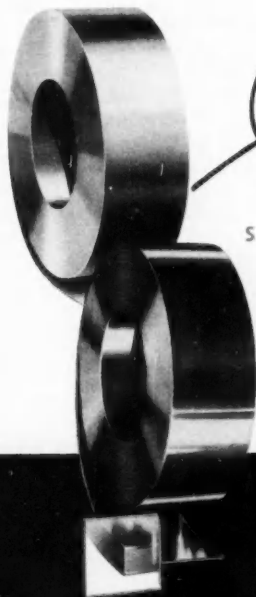


*Finer*  
**STRIP STEELS**  
**FOR YOU IN 1950!**

**OVER 50 YEARS OF**

*Specialization*

**IN STRIP STEELS**



STAINLESS

SPRING STEELS

CLAD METALS

ALLOYS

*Specialization*, in the fundamental Superior way, extends throughout our plant facilities, our research and our manufacturing techniques . . . to the sole end of producing finer strip steels for our customers. Our new plant installations, —including the Hot Mill shown above, cold rolling mills, and strip handling and storing facilities—signify faster, better service over a wider market range. • Let us detail the benefits to you of Superior specialization!

**Superior Steel**  
**CORPORATION**

CARNEGIE, PENNSYLVANIA



The **CRANKSHAFT** is the backbone of the internal combustion engine.

Modern trends—more r.p.m.'s, higher compression ratios, more power per cubic inch of displacement—all lend additional emphasis to the importance of crankshaft quality.

**WYMAN-GORDON** experience, the most extensive in the industry, assures the maximum in physical properties, uniform machinability, and balance control.

*Standard of the Industry for More Than Sixty Years*

**WYMAN - GORDON**

*Forgings of Aluminum, Magnesium, Steel*

WORCESTER, MASSACHUSETTS, U. S. A.

HARVEY, ILLINOIS

DETROIT, MICHIGAN

## NEW PRODUCTION AND PLANT EQUIPMENT

For additional information please  
use coupon on page 56

(Continued from page 64)

the use of stock sheaves. The reducer contains a double train of helical steel gears, heat treated and shaved. It is locked to the shaft, on both sides of the unit, by steel locking collars. A bushing keyed into the sleeve adapts the sleeve to any desired shaft size. The light weight of the unit is emphasized by the fact that size No. 1 weighs but 35 lbs.

A torque arm, which gives the unit its name, anchors the reducer and provides adjustment of the belt tension through use of a turn buckle. No sliding motor base or foundation or flexible coupling is needed.

To prevent reversal of the load an ingenious backstop is available which is installed on the input shaft and sealed from dust and dirt inside the machined cast iron housing. Different output speeds can be attained by changing one of the sheaves in the drive. The reducer is shifted from one machine to another, and if a different size shaft is involved an inexpensive bushing is all that is required.

### J-27—Hydraulic Diamond Turner

Replacing their original hydraulic diamond turner, model 1001-A, with new model 1002-A, the Cleveland In-



Citco hydraulic diamond turner, Model 1002-A

dustrial Tool Corp., Cleveland, Ohio, presents adjustment in diamond turning to three ranges of degrees.

The new Citco hydraulic diamond turner turns and holds the diamond rig-

For Unexcelled Performance

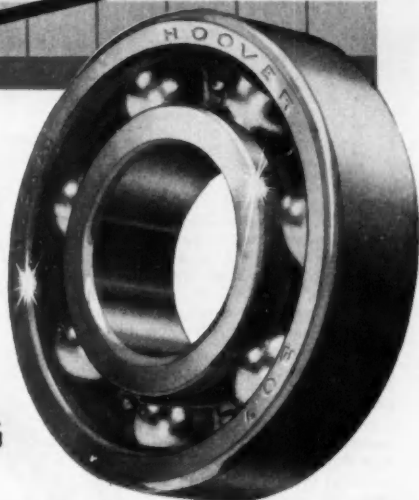
**AMAZING  
QUIETNESS**  
*plus....*

90% LONGER LIFE  
30% GREATER LOAD

**HOOVER**  
*the  
only*

**BALL  
BEARING**  
*with*

**HONED RACEWAYS**



Here are three pertinent reasons why you should consider Hoover Ball Bearings — with honed raceways. First, these bearings achieve unbelievable quietness. Second, they increase bearing life 90 per cent. Third they have a 30 per cent greater load capacity. When you specify Hoover Ball Bearings you secure these PLUS features without extra cost.

The Hoover Engineering  
Manual gives all the facts.  
Write for your copy.

THE ARISTOCRAT



OF BEARINGS

**HOOVER BALL and BEARING CO.**  
Ann Arbor, Michigan

# NEW • PRODUCTION • EQUIPMENT • PLANT •

idly by hydraulic means, generates on the diamond a definite and consistent sharp edge in any one of the three ranges by automatically repositioning the diamond every  $3\frac{1}{2}$ , 7, or  $10\frac{1}{2}$  degrees, respectively. Turning impulses are so timed as to automatically split

the segment on the diamond face at the completion of the turning cycle, thereby maintaining a new and every ready cutting edge throughout the life of the diamond, and eliminating exposure of flat surface to the grinding wheel.

## Manufacturers of... HARDENED and GROUND PARTS for over 40 years

**S**INCE the day of the duster and goggles, The Brown Corp. has meant highest quality precision parts for the automotive industry. Today, Brown Parts serve trucks, tractors, trailers, buses, axle builders, off-the-road machines and Diesel locomotives. The production methods and facilities we have developed are unexcelled—uniform product quality is assured—deliveries are reliable—service is efficient. Ask any of our long list of satisfied customers throughout the industry.

For further information about our specialized production of hardened and ground automotive and industrial parts, just drop us a note. We invite an opportunity to quote on your work.

*Harry W. Brown*  
PRESIDENT



KING PIN

Parts include . . .  
King Pins  
Shackle Bolts  
Shackle Pins  
Brake Anchor Bolts  
Countershafts  
Idler Shafts  
Stub Axle Shafts  
Steering Ball Bolts  
Beam Balls and Bolts  
5th-Wheel Rocker Shafts  
Wheel Studs  
Water Pump Shafts  
... anything in the hardened and ground line, of any analysis steel, up to  $4\frac{1}{4}$ " diameter.

# THE BROWN CORP.

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SYRACUSE, N. Y.

C. H. Ehlert, 3807 Clarendon Rd., Cleveland • N. F. Sprang, 4216 Balfour Rd., Detroit • R. C. Sanderson, 5252 Broadway, Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Elmer L. Kingsland, 6888 Beechley Ave., Long Beach, Calif. • J. B. Hunt, E. L. Kingsland Co., 3611 S. E. Yamhill St., Portland, Ore.

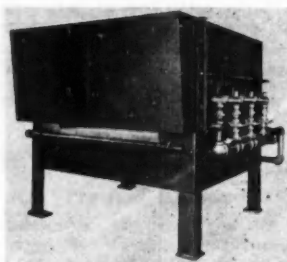
For additional information regarding any of these items, please use coupon on page 56

The new diamond turner, precision built to last the life of the machine of which it becomes a rigid and permanent part, has moving parts sealed in oil with no exposure to outside elements.

Advantages of use are cited as removal of all fear of burnt and shattered diamonds; maintenance of standard production between dresses; maximum efficiency of both wheel and diamond; conversion of down time formerly used in turning and resetting diamond tools, into production time; and elimination of manned diamond turning.

## J-28—Gas-Fired Forge Furnace

Improved line of gas-fired forge furnaces announced by the Eclipse Fuel Engineering Co., Rockford, Ill., are engineered for heavy duty and continuous operation, at the usual forging temperatures of 2200 F. Furnace shell



Eclipse gas fired forge furnace

is of heavy angle framework with sides and back of steel plate, electrically welded to structural steel legs. Heat loss through walls is reduced by use of first quality insulating firebrick.

Burners are of the semi-nozzle mixing McKee entrainment type, located to prevent flame impingement on pieces being heated, and to give uniform heat distribution. A McKee zero governor gives automatic, efficient control of the air-gas ratio throughout entire range of the burner. Silimanite tuyere burners are used to provide long block life and minimum slag. Fuel burners are designed to use low pressure gas, 3 to 10 in. W.C. and 16 oz. air, but high pressure burners are available.

The operator is protected by a curtain of air which carries the heat away from the operator and behind the specially designed refractory-lined heat shield. This shield is adjustable to cover the section of the slot not being used.

# A LESSON IN SAVING—

*Production  
Problem*

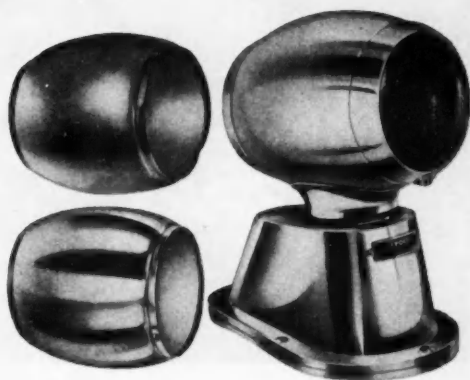
+  
**REV-O-LITE  
ENGINEERS**  
+  
**REVERE**

**ELIMINATION OF COSTLY  
FORMING OPERATIONS, BRAZING  
AND EXTRA HAND FINISHING,  
PLUS FASTER PRODUCTION...  
AND AN IMPROVED PRODUCT**

**I**N the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6" in length and is 4¼" in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed?

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated, production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

Perhaps one of the many types of Revere Brass or one of the other Revere Metals or Alloys can help you improve *your* product—cut your production costs. Why not tell Revere's Technical Advisory Service about *your* metal problems? Call the Revere Sales Office nearest you today.



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.

## **REVERE**

**COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, New York

• • •

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Los Angeles and Riverside, Calif.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere.

# NEW PRODUCTS for AIRCRAFT

FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 56

## T-6—Right-Angle Gear Units

Recently redesigned by Airborne Accessories Corp., Hillside, N. J., for universal mounting, the improved model

ANGLgear—a standardized right-angle unit—now includes a rectangular 4-hole mounting flange with an internal pilot on both ends of the housing. These mounting arrangements are in addition to the 3-hole side mounting originally employed. The unit is further modified to make available 2-1 reduction as an optional extra feature in addition to the standard 1-1 ratio. Incorporation of this universal mounting feature reduces the models required from four to two, which are available for delivery from stock.

## THE SAFEST DIRECTION SIGNALS

have  
SAFETY  
Pilot  
Lights



The safety pilot light is an exclusive feature of the TUNG-SOL Flasher and an important one wherever flashing signals are employed. In automobile applications it does more than tell that the switch is "off" or "on". It indicates when flashing that the signal system is functioning properly. Should the pilot light not respond when the switch is on, it is a warning of a failure in the circuit.

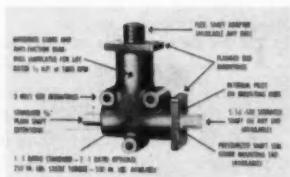
TUNG-SOL Flashers have ten years of automotive use to recommend them. They start instantly, have crisp action, consume little current and are not affected by ambient temperatures. A TUNG-SOL Flasher normally lasts for the life of the car without attention. There is a type for every application. Write for brochure.



## TUNG-SOL SIGNAL FLASHERS

ALSO AUTO LAMPS, ALL-GLASS SEALED BEAM LAMPS AND ELECTRON TUBES

TUNG-SOL LAMP WORKS INC., Newark 4, N. J. • Sales Offices: Atlanta Chicago • Dallas • Denver • Detroit • Los Angeles • Newark • Philadelphia



Airborne standardizing right-angle unit, ANGLgear.

The standard unit is rated at 250 in. lbs static torque capacity or to transmit 1/3 hp at 1800 rpm continuous duty. As an optional extra, units can be furnished with 500 in. lb static torque rating.

The units meet requirements by original equipment manufacturers for durable right angle drives and are also handy for "spot" applications on special tooling and similar applications, the manufacturer points out.

## T-7—Flexible Drive Coupling

A small fist-sized flexible drive coupling, capable of handling torque loads up to 300 hp at speeds as high as 9,000 rpm, has been developed by the Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., and is currently undergoing tests by the U. S. Air Force at Wright-Patterson Air Force Base, Dayton, Ohio. It permits for the first time use of a remotely-mounted engine-driven gear box which provides power takeoffs for a number of accessories, while utilizing only one engine accessory drive pad.

Heart of the new coupling is a series (Turn to page 76, please)

ARE YOU LOOKING FOR ECONOMY IN 1950?

*Now*

**Bur-Tex** No. 179-50

Plastic-Coated Felt Carpeting

with

**RUBBERIZED BACKING**

**at a NEW LOW PRICE!**

**IT'S BETTER**

... because rubberized backing makes Bur-Tex No. 179-50 water repellent and provides a clean-cut, non-fraying fabric edge. Now you get a sound-absorbing, long-wearing, easy-to-clean plastic surface with easy-to-install features PLUS rubberized backing.

**FOR LESS**

... new rubberized Bur-Tex No. 179-50 is most economical! You get extra-quality, extra-economy in every inch of Bur-Tex you install. Write or call for information.

**BURLINGTON MILLS  
INCORPORATED**

BURLINGTON,  
WISCONSIN

**ONE SOURCE  
ONE ITEM**

*for*

- FRONT and REAR  
FLOOR COVERING
- DASH SEAL
- TRUNK LINING

Actual size illustration ...  
looks like real carpeting  
... available in many combinations of colors.

**Bur-Tex**

# Announcing...

A Complete Line  
of  
Spray, Dip and Brush  
PHOSPHATE COATING CHEMICALS  
for  
PAINT-BONDING  
RUST PROOFING  
and DRAWING

**Paint-Bonding** "Granodine" — zinc phosphate coating chemicals, applied by spraying, dipping, or brushing in a cold, medium, or hot process, improve paint adhesion on steel, iron, and zinc.

**"Lithoform"** — zinc phosphate coating chemical, applied by spraying, dipping, or brushing at room temperature, makes paint stick to galvanized iron, zinc and cadmium.

**Rust Proofing** "Permadine" — zinc phosphate coating chemical, applied in an immersion process forms an oil-absorptive coating on iron and steel that bonds rust-inhibiting oils such as "Granoleum."

**"Thermoil-Granodine"** — manganese phosphate coating chemical, applied in an immersion process, forms a dense crystalline coating on iron and steel which, when oiled or painted inhibits corrosion and when oiled protects friction surfaces.

**Drawing** "Granodraw" — zinc phosphate coating chemical, used in an immersion process, facilitates the mechanical deformation of steel.

Write for further information on any of these phosphate coating chemicals and processes and how they can be adapted to your production.

Pioneering Research and Development Since 1914  
**AMERICAN CHEMICAL PAINT COMPANY**  
AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

## NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

(Continued from page 62)

The spiral feature overcomes objections present with both steel and carbide drilling—dust accumulation in the bottom of the hole which packs almost solid until the point where its resistance stalls the drill (illustrated).

With the new Carbology wire "live-spiral" masonry drill (shown), the wire, solidly attached to the shank at lower and upper end, is wound around the shank in a low-spiral helix. Dust cut loose by the tip in any type of masonry is said to "march" right up around the spiral and out of the top of the hole, accumulating in a neat circular mound around the O.D. of the hole.

Pressure required on the drill is no greater at the end of a deep hole than at the start. Dust is removed as fast as it is formed. Dust explosions are also eliminated. Less heat is generated. Drill life is increased. A nearly constant rate of penetration results.

The new drills—which fit any rotary drill, drill press or hand brace—are available in ten diameter sizes ranging from ¼ in. up to and including 1 in.

### K-53—Hot Work Tool Steel Alloy

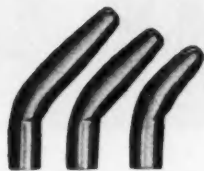
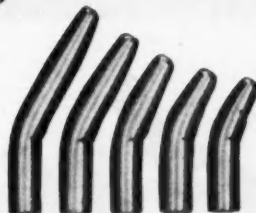
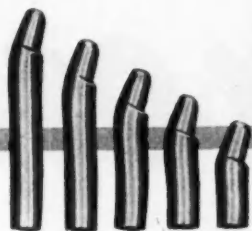
A new tool steel alloy marketed by Allegheny Ludlum Steel Corp., Pittsburgh, Pa., under the name B-47 Hot Work Steel is a combination of chromium, tungsten, cobalt, vanadium and iron said to have excellent resistance to shock and abrasion at elevated temperatures. Although its good hot hardness permits the alloy to do any number of severe hot work jobs without washing out or changing size, it is specifically recommended for applications requiring good toughness at relatively high hardness, or where abrasion resistance and resistance to heat checking are important factors. The new product is recommended for such applications as brass extrusion dummy blocks and dies, valve extrusion die inserts, forging die inserts, forging press dies and hot punch tools.

### K-54—Centrifugally Cast Sleeve Irons

A controlled type A graphite pattern for sleeve irons has been developed by the Centrifugal Foundry Co., Muskegon, Mich. Irons are centrifugally cast in permanent molds, either alloyed or unalloyed. Laboratory-tested electric

(Turn to page 78, please)

**Results  
Beyond  
Specifications!**



Single bend tips can be supplied with bends of varying degrees from 0° to 15° and in varying over-all lengths at minimum costs. Illustrated is a cross-section of the many combinations of angles and over-all lengths available.



*Cross-section illustrating the exclusive Mallory Fluted water hole.\**

**REASONS WHY  
MALLORY FLUTED TIPS  
ARE SETTING  
WELDING RECORDS**

- 70% increase in cooling area.
- Faster heat dissipation.
- Reduced mushrooming.
- Less frequent dressing.
- More rigidity.

*Available in all types of tips with #1, #2, and #3 Morse tapers.*

**Mallory  
Fluted Single Bend Tips  
For Resistance Welding  
*Last Longer, Cost Less!***

Mallory continues to develop more perfect resistance welding tools... products of research and testing facilities which are unequalled in the field.

A good example of practical product improvement is the new Mallory Fluted Single Bend Tip for gun and special welding applications... cold-formed from rod stock tips... therefore possessing physical and mechanical properties superior to forgings or castings. This in combination with the record-setting Mallory fluted water hole gives you a combination of unbeatable features in a variable range of angles and over-all lengths.

*That's results beyond specification!*

Mallory's resistance welding know-how is at your disposal. What Mallory has done for others can be done for you! Write for Bulletin RW-1049, which gives full specifications.

*West Coast Office and Warehouse: 1336 So. Lorena St., Los Angeles 23, California*

*In Canada, made and sold by Johnson Matthey and Mallory, Ltd., 110 Industry St., Toronto 15, Ontario*

**Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings**

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**MALLORY**

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Capacitors	Contacts
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\*Patent Pending

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# Redmond



ASSEMBLY LINES HANDLE VARIETY OF MODELS

From these modern Redmond plants come a broad variety of practical Redmond Micromotors and Blowers. Here you get longer-life, smoother-running power units of tested high performance.

Whether the quantities you use are large or small, you get the same personalized service, just as though the Redmond organization were a division of your own



MICROMOTORS ARE INDIVIDUALLY TESTED



ARMATURE WINDING IS STREAMLINED TOO



Over 150 models in 25 types of Series and Shaded Pole Micromotors and Blowers • •



## AC MICROMOTORS FOR REPLACEMENT

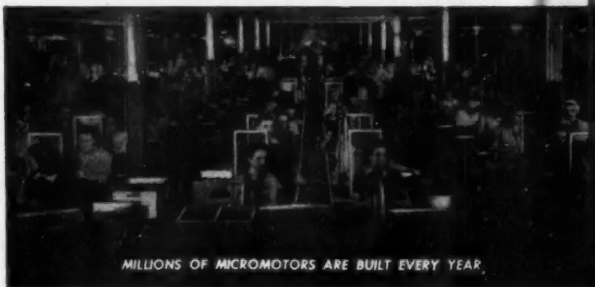
Many Redmond customers, not set up to handle replacement motors, appreciate Redmond's replacement motor distributing organization. Approximately fifty of the more diversified AC Micromotor and Blower models best suited for replacement purposes are sold through more than eighty approved outlets located in key cities from coast to coast.

# Small Motors

## MICROMOTORS

business. And remember this . . . Redmond Company builds no consumer products in competition with your own.

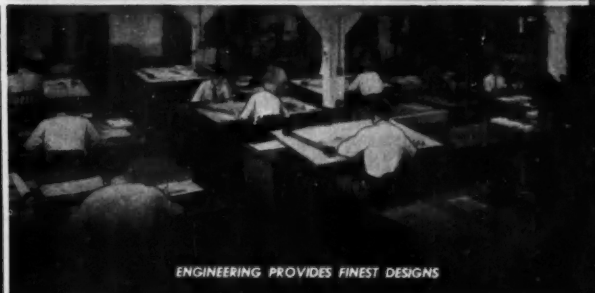
To gain the important benefits of 25 years of progressive electrical engineering and precision manufacturing, to get extra values in sub-fractional electric motors, check with Redmond . . . the **BIG name in Small Motors.**



MILLIONS OF MICROMOTORS ARE BUILT EVERY YEAR.



FIELD COILS ARE ACCURATELY WOUND



ENGINEERING PROVIDES FINEST DESIGNS



• • Special electrical characteristics, finishes, shafts, accessories, etc., are available.

**Redmond**  
COMPANY, INC.

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WESTERN AREA: (Redmond Company of Calif., Inc.),

1248 S. Boyle Ave., Los Angeles 23, California

SERIES MOTOR SALES OFFICES: Owosso, Michigan

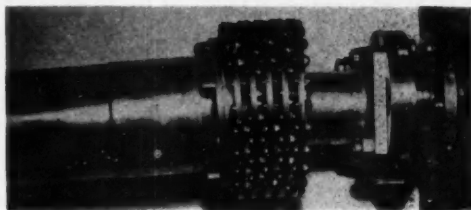
OVERSEAS SALES OFFICES: 420 Lexington Ave., New York 17, N. Y.



## New AIRCRAFT PRODUCTS

For additional information please use coupon on page 56

Close-up of flexible drive coupling of Eclipse - Pioneer Division, Bendis Aviation Corp.



(Continued from page 70)

of eight steel diaphragms, each having a hyperbolic wall section whose thickness tapers to less than ten thousandths of an in. These wafer-thin disks provide the flexibility necessary to permit misalignment up to  $3\frac{1}{2}$  deg, yet are

rugged enough to absorb power surges, peak speeds and maximum loads. In engineering tests conducted by Eclipse-Pioneer, a single pair of disks has been subjected to full operating speeds and

flexure loads at 8000-11000 rpm at a continuous misalignment angle of 10 deg—three times the expected requirement—and reportedly has already passed the 1300-hr mark with no sign of failure or fatigue.

Regarded as a tremendous advance over previous types of flexible drive couplings, none of which had been able to withstand the extremes encountered in modern aircraft operation, the new coupling was designed to aid specifically in solving the ever increasing power supply problems of today's complex, multi-engine air giants. Its companion unit, the gear box, is mounted on the fire wall of the nacelle and connected to the engine by a drive shaft. Flexible couplings at either end of the shaft, channel power through the angle of misalignment while the sliding action of special splines on the shaft compensates for the normal axial movement of the engine.

**The Thermostat**  
TO SATISFY ALL DEMANDS  
of the  
*Modern Cooling System*

DV1

DV2

DV3

The Dole DV Thermostat is designed to hold its valve at the proper degree of opening against pump pressure at any car speed, regardless of outside temperature. It maintains efficient engine operation under varying conditions and works equally well in both regular and sealed cooling systems with pressure caps.

# DOLE

**DV**  
**THERMOSTATS**

CONTROL WITH DOLE

**THE DOLE VALVE COMPANY** • 1901-1941 Carroll Avenue, Chicago 12, Illinois  
PHILADELPHIA • DETROIT • LOS ANGELES

Also Manufacturers of Copper Tubing Couplings . . . Aircraft Valves and Fittings . . . Brass Screw Machine Products

### T-8—Copper Core Stainless Sheet

Engineers in the field of jet power are said to be counting on the thermal properties of Rosslyn Metal Sheet, produced by American Cladmetals Co. of Carnegie, Pa., to relieve metal difficulties met at elevated temperatures. This sheet consists of a copper core metalurgically bonded permanently on both sides with surfaces of stainless heat resistant steel or Inconel.

The sudden surge of high heats in jet power plants has too often caused hot spots resulting in cracking and buckling of heat resistant metals used up to now in aircrafts, according to the company. With the sheet, troublesome high temperatures are conducted by the copper core away from hot spots to equalize conditions over the entire power plant unit.

The hard, durable heat resistant and corrosion resistant high chrome-nickel steels and Inconel, when used in Rosslyn Metal with its copper core, but only so used, are said to provide excellent thermal conductivity and structural and non-oxidizing properties.

Those working with Rosslyn Metal in the jet, gas turbine, and rocket type power fields anticipate by the use of Rosslyn Metal not only improved performance, but also conservation of such strategic metals as columbium and cobalt, high on the critical lists, the company states.

**Come to  
sleeve  
bearing  
Headquarters**



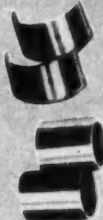
**for  
uniform  
quality and  
service**



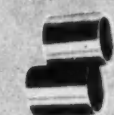
**STEEL &  
BABBITT**



**BRONZE  
&  
BABBITT**



**SHEET BRONZE**  
Plain or Graphited



**CAST BRONZE**  
Plain or graphited



**BRONZE ON STEEL**  
Plain or graphited

**LEDALOYL**  
Self-Lubricating



*This modern, up-to-date plant of the Johnson Bronze Company, occupying over 400,000 square feet of manufacturing space, is devoted exclusively to the manufacturing of Sleeve Type Bearings.*

**J**OHNSON BRONZE understands the requirements of the automotive industry and, consequently, through the years has been a major source of supply for sleeve bearings. Large facilities are devoted exclusively to production for this one industry. Therefore, you can depend on Johnson Bronze quality . . . expert designing, high quality materials, careful workmanship, multiple-testing for uniformity and precision . . . and prompt service.

**Johnson Bronze**  
SLEEVE BEARING HEADQUARTERS  
625 SOUTH MILL STREET • NEW CASTLE, PA.

*You will find Johnson Engineers willing to help you decide which type bearing is best suited and to design it for the application. As we manufacture all types of sleeve bearings, we base all of our recommendations on facts, free from prejudice.*

# NEW PRODUCTS

(Continued from page 72)

furnace metals are employed in the process.

The secret is said to have been to control the cooling period uniformly in

order to obtain the type A graphite throughout the entire wearing structure of the iron. Low scrap loss, reduction of finishing operations, and better dry lubrication are among claimed advantages of this type iron.

## DEPEND ON *Mitchell* FOR THESE SPECIALIZED PRODUCTS

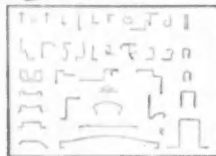
- Ignition switches
- Turn signal switches
- Rolled shapes

Mitchell ignition switches, turn signal switches and rolled shapes meet the most exacting specifications of the automotive industry for quality and excellence of design. You will find these Mitchell products widely used by leading manufacturers of cars, trucks, buses and tractors.



AUTOMOTIVE  
IGNITION SWITCHES

Installed as original equipment on many popular-make motor cars, trucks and buses, Mitchell ignition switches are known for their sturdy construction and extra long life. "Radio" position available without extra cost.



Mitchell clamp-on semi-automatic turn signal switch designed especially for trucks.



Mitchell built-in type semi-automatic turn signal switch used in passenger cars.

➤ **TURN SIGNAL SWITCHES**—Mitchell semi-automatic, self-cancelling turn signal switch affords motorists an easy, positive method of indicating right or left turns—gives pedestrians and approaching and following vehicles accurate, fully visible turning information.

➤ **ROLLED SHAPES**—Mitchell offers a complete range of metals, designs and gauges in stainless steel, aluminum, brass, bronze, copper; cold rolled, drawn and pressed for automobiles, airplanes, architectural requirements, railroad cars, radios, television receivers, all industrial uses.

Our sales engineers work with you in the application of Mitchell products to your specific designs. Call on us at any time.

### UNITED SPECIALTIES COMPANY

MITCHELL DIVISION • PHILADELPHIA 36  
IGNITION AND TURN SIGNAL SWITCHES • ROLLED SHAPES • DOVETAILS  
UNITED AIR CLEANER DIVISION • CHICAGO 28  
AIR CLEANERS • METAL STAMPINGS

For additional information regarding any of these items, please use coupon on page 56

## K-55—Multi-Purpose Inspection Instrument

The pocket comparator, a high-precision optical measuring instrument for multi-purpose inspection of small parts or small dimensions on large parts, accomplishes checking of linear measurements, circles, angles, radii, etc., in one instrument. Manufactured by Bell and Howell Co., and distributed by National Tool Co., Cleveland, Ohio. The pocket comparator embodies a new principle by permitting the user to compare through a magnifying lens, the part to be checked against a finely calibrated pattern or reticle. The lens is a triplet-design aplanatic type of great accuracy and has a magnification of approximately 7 to 1.

The instrument, new to industry, has been used by Bell and Howell, its manufacturer, for five years. It has there-



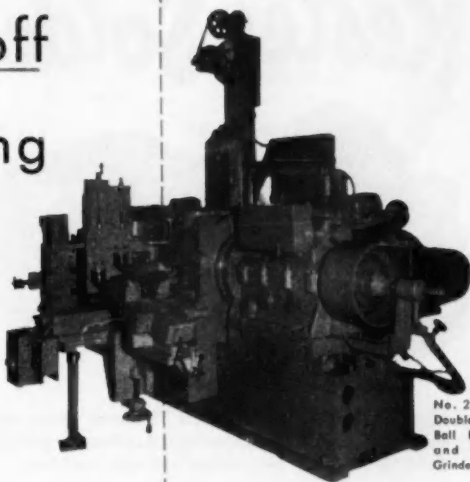
The pocket comparator—new multi-purpose inspection instrument manufactured by Bell and Howell

fore been thoroughly tested in checking forms and sizes of punches and dies; checking gauges, templates and layouts; checking forms and dimensions of all types of cutting tools and checking wear on the cutting edges; checking the ground form on conventional tool bits; checking the form on circular and flat form tools; and checking the size of small holes, fine threads and wires.

The reticle of the pocket comparator is calibrated for measuring lengths, widths, complete circles, radii and angles. The upper part of the reticle has lengths graduated in steps of 1/64, 1/32, 3/64, 3/32, 1/8, 3/16 and 1/4 in. There is also a linear rule of 1/2 in. with 0.005 in. increments, and a 10 mm

**in grinders...**

your pay-off  
for choosing  
**BESLY**  
is results  
like these!



No. 226-30" Besly Double-Spindle Wet Ball Bearing Outer and Inner Ring Grinder.

**\* RESULTS**

... 30 automotive valves per minute  
Finish grinding of stem ends with No. 218-20" Besly Grinder. Ends are ground square with stem .002" for length — within a tolerance of .0003" locating from taper seat. 15-20 micro-inch finish is imparted. One grinder handles many valve stem sizes with a single fixture.

**\* RESULTS**

... Up to 3000 coil springs per hour with this No. 926-42" Besly Double-Spindle Vertical Grinder. Ease and speed of loading sharply increased. Wheel dressing greatly simplified. Change from one spring size to another quickly made.

**\* RESULTS**

... 24,000 ball bearing races per hour  
Piece-to-piece dimension tolerances held to .0002"—with No. 226-30" Besly Double-Spindle Wet Grinder. Approximately .007" stock from outer races .218" wide and 1½" in diameter is removed. Work produced is parallel within .0001". Maximum capacity of the machine 30,000 ball bearing races per hour!

Just as they have done in the case studies reported here, the chances are Besly Grinders can help you to lower-cost production and improved quality of output. In scores of other companies they have achieved similar results. So, call in the Besly engineer. Let him show you whether your grinding operations can be made more efficient. In addition, it's very likely that he can point out new applications in which a change-over to grinding can substantially reduce your processing costs. Such a survey costs you nothing—but the experience of the Besly engineer and engineering organization can be invaluable to you. Write us today.

\* All names furnished upon request.



CHARLES H. BESLY & COMPANY

TAPS—the world's most accurate tap.

TWIST DRILLS AND REAMERS—Complete line for every need.

TITAN ABRASIVE WHEELS AND DISCS—individually formulated for your job.

GRINDERS that reduce costs on every type of surface grinding.

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# Kester Solder



Flame Soldering with Kester "Nosput" flux-core solder. One of Kester's specialized industrial solders that does this job better than any other solder.

## No Waste

"Nosput" flux-core solder is only one member of Kester's famous group of flux-core solders. In all there are over 100,000 different types and sizes.

## Efficient

Kester can supply the right solder for the job, virtually eliminating waste and rejects. Call in a Kester expert and have him analyze your customers soldering operations.

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Newark, New Jersey • Brantford, Canada

Send for free manual:  
"SOLDER and Soldering  
Technique"

**KESTER  
SOLDER**

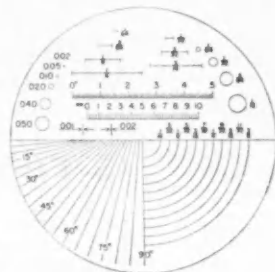


Standard for Industry since 1899

## NEW PRODUCTS

For additional information please  
use coupon on page 56

linear rule with 0.2 mm increments. Circles are shown graduated from 0.002 in. to 0.050 in. diam and from 1/64 in.



The reticle or pattern of the pocket comparator made of optically polished crown glass.

to 1/16 in. diam. The lower half of the reticle is patterned to measure angles between 0 and 90 degrees in steps of 5 degrees, and to measure radii from 1/16 in. to  $\frac{1}{2}$  in.

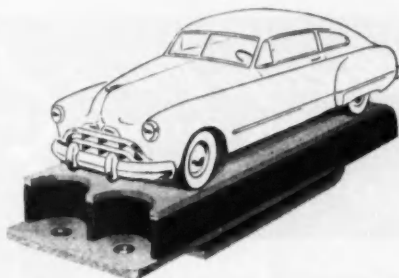
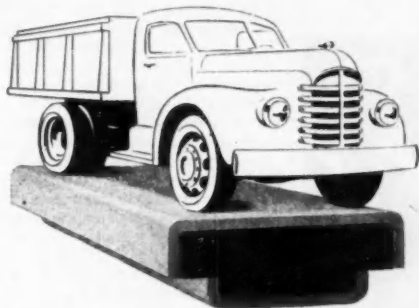
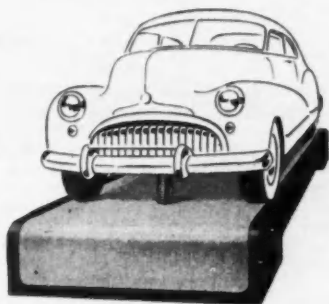
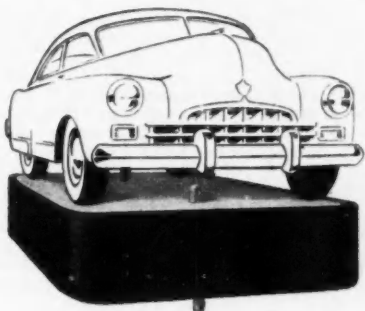
### K-56—Cut Wire Steel Shot

Blasting material called Pellets made by Pellets, Inc., Buffalo, N. Y., comprises cut wire steel shot produced from SAE 1065 hard drawn spring wire of 45-51 Rockwell/C hardness, said to have a proven useful life of 10 to 15 times that of cast iron shot. Blasting equipment maintenance costs are reduced up to 75 per cent and wheel blade life increased up to 2000 hrs, according to the company. The small steel cut wire cylinders round up into spherical steel ball-bearing-like pellets and hammer away for weeks. Sizes available are comparable to SAE standard shot sizes.

### K-57—Adjustable-Speed Motor Drive

A smaller all-electric variable-voltage type adjustable-speed motor drive to operate on a-c is being marketed by the Reliance Electric & Engineering Co., Cleveland, O. This new V\*S unit, available in  $\frac{1}{4}$ , 1, 1 $\frac{1}{4}$  and 2 hp sizes, is designed to meet the specialized requirements of original equipment manufacturers for machine tools, drilling, grinding, buffing and polishing machines, etc.

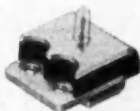
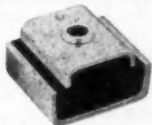
Operating on single-phase a-c power with "round-the-clock" speeds ranging (Turn to page 94, please)



***True! Rubber-to-Metal parts, strategically placed, help make today's cars run more silently and smoothly***

**BUT**—these sandwiches do a better job when made by U. S. Rubber in the new streamlined plant at Fort Wayne. Why better? Because "U. S." employs the "Brass-o-matic" process, which results in a permanent bond—and which is exclusive with "U. S."

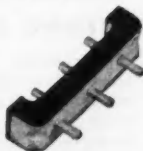
Not only that, but "U. S." engineers will work closely with you to make sure the



engineered rubber product you require.

Just call or write United States Rubber Company—Engineered Rubber Products Division—Fort Wayne, Indiana, or 5850 Cass Avenue, Detroit.

design, the rubber compounding, and the bonding of rubber to metal all result in the precisely



**ENGINEERED RUBBER PRODUCTS  
FOR THE AUTOMOTIVE INDUSTRY**

MADE AT FORT WAYNE BY

**U.S. RUBBER**  
SERVING THROUGH SCIENCE

**UNITED STATES  
RUBBER COMPANY**

# Heavy Duty Bearing Test Machine

(Continued from page 37)

design the 9/32 in. diam hole containing the thermocouple wire insulator rod and pressure spring was drilled through the bearing carrier so that an area of the bearing 9/32 in. in diam was unsupported by the carrier. Premature bearing lining fatigue occurred directly above the thermocouple. This difficulty was eliminated by decreasing size of the drilled hole in the carrier to

5/32 in. diam at the bearing back as shown in Fig. 7. In thousands of hours of testing since the installation of the redesigned contact buttons, no fatigue failures have been caused by this method of measuring the test bearing temperature.

The method of mounting the test machines is shown in Fig. 1. The test machine housing is bolted to a heavy

steel bedplate which is in turn supported on spring type vibration isolators. The concrete footing, to which the vibration isolators are secured, also supports a 20-hp electric motor driving the test machines. The drive motor consists of an a-c induction motor coupled to an eddy current clutch, both units being housed in a single frame. The speed range of the output shaft of the unit is 300 to 1600 rpm. The output is controlled by a rheostat which varies the d-c excitation of the eddy current clutch. A centrifugal type governor also mounted on the motor can be used in conjunction with the rheostat to control the clutch speed within approximately  $\pm 25$  rpm in the speed range of the motor. A multiple Vee belt drive connects the driving motor to a jackshaft which is in turn coupled to the rear balancing assembly through a flexible coupling. With this type of motor, it is possible to set the torque output at any value from the torque required to drive the machine at the given speed to the maximum motor torque. This characteristic is sometimes useful, since it can be used to prevent unnecessary test bearing destruction if a bearing seizure occurs. A wattmeter is used to record the input to the induction motor; therefore, it is also possible to compare the magnitudes of bearing seizures, using the governor to maintain a given speed.

Each test machine instrument panel is equipped with oil pressure gages, a wattmeter, driving motor controls, speed counter and indicator, lubrication system electrical controls, and a thermocouple selector switch. Auxiliary electrical and pressure controls will stop the test machine for the following reasons: (1) Oil pressure below predetermined setting. (2) Bearing temperatures above predetermined setting.

Electronic-type potentiometer pyrometers located on a separate panel are used to record and indicate bearing temperature, oil pressure and other pertinent temperatures.

The fatigue life and seizure resistance of babbitts, copper-lead, bronze, aluminum, and silver bearings have been evaluated and the comparative performance as determined by the test rig agree well with field service experience.

An interesting test has been developed to determine quantitatively the relative tolerance of various bearing materials to foreign material in the lubricating oil. Sand of a controlled particle size is introduced to the test bearing lubricating oil in the form of paraffin enclosed capsules. Results from sand capacity tests agree well with ratings established by service experience and other methods.

## Chicago Rivet

**AUTOMATIC SETTING**

## SLASHES UNIT COSTS!

If your product involves a fastening operation—wood to wood, metal to metal, fabric to fabric, composition to composition, or any combination of these—you can slash unit costs by increasing production volume with high speed Chicago Rivet Automatic Setters and Chicago Rivet tubular or split rivets. Four rivets are automatically fed, inserted and upset at one release of the foot pedal by the quadruple model Chicago Rivet Setter. Single, double and triple setters are also available.

Quick change hoppers, available as extra equipment, enable some models to switch quickly from one size and style rivet to another. Nearly all models clinch grommets, eyelets, staples and Dzus fasteners and insert drive screws—all automatically.

**FREE FASTENING CLINIC**

If your product is small, send us an unfastened sample. If it's large, send us a sub-assembly. We will gladly analyze your fastening problem, recommend the type rivet and Chicago Rivet Automatic Setter needed and estimate production rates that can be set up on the job.



**Bench type Double Rivet Setter with Adjustable Riveting Centers**

**A Few Applications**

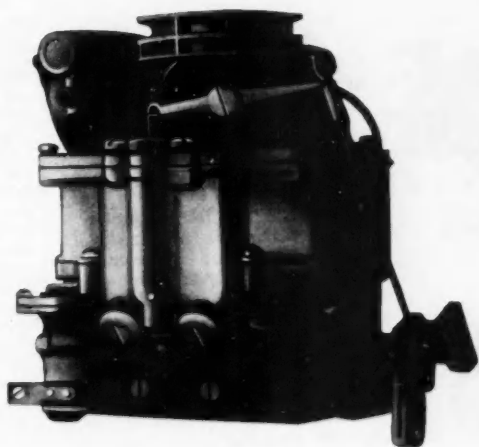
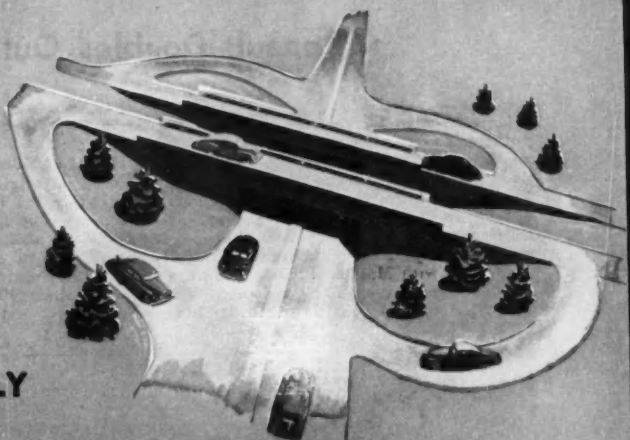
- AIRPLANE PARTS
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- SHOES & BRATES
- STEP LADDERS
- STOVES
- TELEPHONES
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Chicago Rivet

**CHICAGO RIVET & MACHINE CO.**  
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# CONCENTRATION

**CARBURETORS—  
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FOR NEARLY 40 YEARS**



**You Can Depend on the Name**

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**for the finest carburetion**

**ECLIPSE-MACHINE DIVISION OF**

• Standard Equipment Sales: Elmira, N. Y.  
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## Renault Doubles Output with ECA Aid

Marshall Plan aid has been the shot in the arm needed by the Renault automobile factory to enable it to double its prewar production and to place the French firm in an increasingly strong position in the export markets. The multi-million dollar modernization program to put the Fiat Co. of Italy back on its feet with Marshall Plan aid as well as Export-Import Bank assistance was described in an article which ap-

peared in *AUTOMOTIVE INDUSTRIES*, Sept. 1.

With the aid of ECA funds, Renault has exceeded its original goal and is currently rolling the light, low-priced cars off its assembly lines at the rate of 330 a day. In addition, the plant is daily turning out 70 commercial type cars, 55 one-ton trucks, 20 2½-ton and four seven-ton vans, 40 tractors and one motor coach.

This makes Renault by far the largest French producer, its 1948 business volume running in excess of \$85 million. It produced about 68,500 cars and trucks or approximately a third of total French production which fell just short of 200,000 vehicles. Citroën is the second ranking manufacturer, turning out 42,800 vehicles last year. Peugeot was third with 33,600.

With a light car built to sell at the equivalent of \$900, Renault is now becoming a competitor of the Italian Fiat—which also expanded with ECA help—in the continental export market. In addition, the company is developing other export markets in the United States, Cuba, Panama, Australia and other nations.

Renault's exports last year totaled more than 13,700 passenger cars and 4,800 trucks, a substantial portion of its 24,000 increase in output for the year. This netted about \$16 million in prized foreign exchange.

This potential foreign exchange earning power is one of the major reasons given by ECA for its assistance to the firm which, in effect, is nationalized. Actually, it operates as a private firm but under a manager appointed by the state which seized the works soon after liberation.

As in the Fiat agreement, a substantial portion of Marshall Plan help has been in the form of equipment to restore the factory, bombed out during the German occupation because it was engaged in making tanks. As a result about 25 per cent of the machinery was destroyed. Still other equipment was worn or obsolete and has been replaced by modern machinery, including 16 body stamping presses ranging from 850 to 2,200 tons in capacity.

Also, ECA funds supplied 50 per cent of the needed copper and about 44 per cent of the petroleum products imported to drive the cars and trucks. The firm has benefited less directly through ECA financing for development of the French electric power supply.

The rate of recovery by the firm has amazed even Marshall Plan officials. In 1946, production was about 12,000 vehicles, 28,800 in 1946, and 44,100 in 1947. French vehicle production as a whole has been less rapid, the 1948 total of nearly 200,000 still being under the prewar figure of 224,000. It is conservatively estimated that the 1949 figure will be about 300,000—far short of double the prewar totals as has been the case of Renault.

One reason has been that Renault facilities are well integrated. The firm produces most of the materials it needs, from cardboard to steel. Steel shortages have hampered the industry but Renault has its own foundries on the

Check These 6 Advantages of  
Redesigning Your Product with a...



Sturdy and reliable, explosion proof construction, helical geared fuel transfer pump motor.

### Lamb Electric SPECIAL APPLICATION MOTOR

By using Lamb Electric motor parts or a complete frame motor—engineered for the exact requirements of your application—you may gain these advantages:

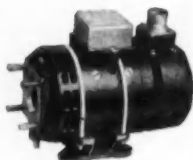
#### IN THE MOTOR—

1. Reduced cost, weight, space.
2. Exact mechanical and electrical characteristics.
3. Thorough dependability.

#### IN THE PRODUCT—

4. Better performance.
5. Improved eye-appeal.
6. Compactness, less weight.

Our engineering department will be glad to team up with yours to help achieve these results. The Lamb Electric Company, Kent, Ohio.

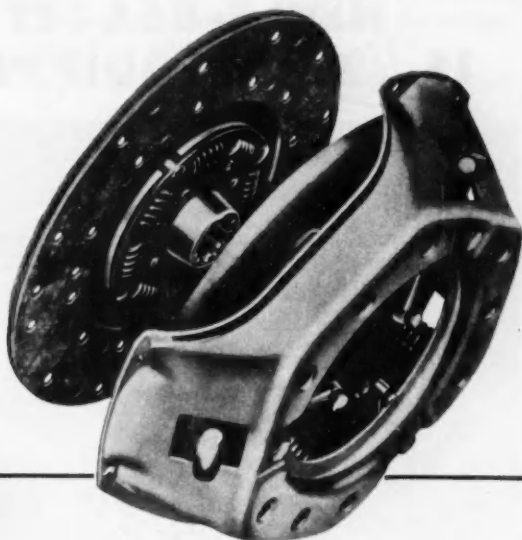


Aircraft hydraulic pump motor with maximum output, minimum weight. Adaptable to many heavy-duty industrial applications.

They're Going Into America's *Finest* Products

**Lamb Electric**  
SPECIAL APPLICATION  
FRACTIONAL HORSEPOWER MOTORS

In stop-and-go traffic driving, Long clutches give smooth, positive, effortless performance. At highway speeds, the semi-centrifugal construction means increased torque capacity—less slippage, less wear. They have equipped millions of cars, trucks, buses and tractors since 1922.



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# LONG

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## *Clutches and Radiators*

- EFFICIENT ENGINEERING
- VOLUME PRODUCTION
- TIME-TESTED PERFORMANCE



Long radiators have been used throughout the automotive world since 1903. Fin-and-tube design and construction provide clean, unobstructed water courses . . . maximum heat exchange. In heavy-duty commercial engines or high-speed passenger cars, this means engines that run cool.



LONG MANUFACTURING DIVISION  
BORG-WARNER CORPORATION  
Detroit 12 and Windsor, Ontario

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# LONG

CLUTCHES • RADIATORS • OIL COOLERS

# NEW F-86A JET IS **LEDEX** EQUIPPED!



## **NORTH AMERICAN AVIATION chose LEDEX ROTARY SOLENOIDS for DEPENDABILITY!**

Humid tropics, sand-laden desert skies, frozen North or extremely high altitudes . . . the new Air Force North American F-86A Sabre Jet Fighter is prepared to defend our nation under *any* conditions. Ledex Rotary Solenoids play an important part in this *dependability*. Several vital mechanisms are remotely controlled and powered by Ledex Rotary Solenoids.

The same Ledex standard of dependable remote control and power is available for your product. The vast production applications of Ledex Rotary Solenoids vary from the dependable snap-action operation of aircraft mechanisms to the powerful actuation of rugged hydraulic valves in heavy duty materials handling equipment.

We supply to quantity users and solicit the opportunity to be of assistance in engineering a Ledex Rotary Solenoid to meet the requirements of your product.

Write today for LEDEX ROTARY SOLENOID  
BASIC ENGINEERING DATA

**G. H. Leland** INC.

160 WEBSTER STREET, DAYTON 2, OHIO



Billancourt side of the Seine river where steel, cast iron, bronze, aluminum and magnesium are turned out. Nearby are parts-fabricating plants while tire plants operate on the opposite river bank.

Another reason for rapid recovery is the introduction of American know-how. According to an official ECA report, "typically American assembly lines are the rule, in the foundries, engine shops and elsewhere . . . The Renault factory arranges meetings where lectures are given about the American motor car and motion pictures are shown. These meetings are invariably well attended."

The firm employs about 37,000 workers currently, including about 4500 female employees. Nurseries are maintained for the children of working mothers and special bonuses are paid production workers for better than schedule output.

## **MEN in the NEWS**

(Continued from page 25)

Allegheny Ludlum Steel Corp.—**Merle J. Graham** has been made Manager of Production. **Frank G. Benford**, Assistant Manager of the company's West Leechburg, Pa., plant, was named to succeed Mr. Graham as Plant Manager. **Joseph A. Martino**, President of National Lead Co., has been elected to the Board of Directors of Allegheny Ludlum Steel Corp.

Colonial Broach Co.—**George L. Carr**, has been appointed Assistant to the Sales Manager.

Willard Storage Battery Co.—**Clarence H. Endress** has been made Chief Engineer. **W. L. Bowron**, formerly Sales Manager in the Dallas district, has been appointed California District Sales Manager. Succeeding Mr. Bowron as Dallas District Sales Manager is **N. G. Wolf**, formerly Manager of Willard's Dallas plant.

The B. F. Goodrich Co.—**Carl G. Horst** has been appointed Manager of Retail Merchandising of the Replacement Tire Sales Division, and has been succeeded as Manager of Retail Credit Sales by **William B. Flora**. Mr. Horst succeeds **Robert L. Reeves**, resigned.

United Aircraft Corp., Pratt & Whitney Aircraft Division—Appointment of **Robert B. Hotz** as Public Relations Manager has been announced.

Acheson Colloids Corp.—**P. C. Buck** becomes Vice-President in Charge of Production; **M. W. Reynolds**, Vice-President in Charge of Sales; and **Raymond Szymanowitz**, Vice-President in Charge of Research.

Fruehauf Trailer Co.—**L. H. Chaille** has been transferred from Regional Manager to Sales Manager of the Los

Chas. F. Kettering said—  
**"Engineering is  
 a combination of  
 brains and materials  
 ...the more brains,  
 the less materials"**

By reducing deadweight 28 pounds — through using MECHANICS 34% lighter UNIVERSAL JOINTS — trucks increase their PAYLOAD over 5,000 ton-miles (during 400,000 miles of operation) without extra cost. For the designer who wants to add to the ton-mile capacity of his truck — without increasing its gross weight — our engineers will be glad to help specify a weight-saving MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFT application.

Let our engineers help add to the ton-mile PAYLOAD capacity of YOUR trucks.

#### MECHANICS UNIVERSAL JOINT DIVISION

Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois

Why haul unnecessary EMPTY WEIGHT poundage that reduces the PAY LOAD part of the legal gross weight allowed for your trucks?

MECHANICS Roller Bearing UNIVERSAL JOINTS Truck PROPELLER SHAFTS are made 34% lighter in weight than any others now in use — without loss of torque capacity. They are stronger than shafts that are half again heavier. MECHANICS 34% lighter UNIVERSAL JOINTS PROPELLER SHAFTS run smoother and place much less load on transmission and pinion bearings. Their fitting yokes are machined all over. With weight-saving worth \$1.00 per pound, you can't afford to handicap your trucks by making them haul useless, non-profit-earning weight hundreds of thousands of miles.

**You Can  
Save**



**28  
Pounds**

*With* **34%** *Lighter*

**M E C H A N I C S**

*Roller Bearing*

**UNIVERSAL JOINTS**

**For Cars • Trucks • Busses and Industrial Equipment**

Angeles branch. **Roy H. Compton** has been appointed Advertising and Sales Promotion Manager of the Company's Western Division.

**Wrought Washer Mfg. Co.**—Two new members have recently been added to the sales staff—**Wm. E. Pfleger** to cover Wisconsin, Iowa, Minnesota, etc., and **Thomas Tannert** to head the new Chicago office.

**Elastic Stop Nut Corp. of America**—The appointment of **Robert F. Fettig** as District Manager for the Detroit and Michigan sales areas has been announced.

**Westinghouse Electric Corp.**—**Burt S. Burke** has been appointed Manager of the Lighting Division at Cleveland.

**Illinois Tool Works**—**Hollis H. Mosher** has been named Sales Engineer in the Detroit sales office.

**Douglas Aircraft Co., Inc.**—**Charles J. Lick** has been elected to the Board of Directors.

**The Kelly Reamer Co.**—The appointment of **Robert Kuntz** as sales and engineering representative for Dayton, Springfield, Hamilton and Cincinnati has been announced.

**Aetna Ball & Roller Bearing Co.**—**J. J. Rozner** has been appointed Works Manager.

**Standard Oil Co. of California**—**H. D. Collier** has resigned as Chairman of the Board of Directors. He will continue as a director of the company. **R. G. Follis** is now Chairman of the Board and **T. S. Petersen** is President.

**Consolidated Western Steel Corp.**—**Charles A. Flannery** has been appointed special assistant to **Ralph W. Seeley**, Vice-President—Sales, Los Angeles.

**Rotary Lift Co.**—Appointment of **Allan Robinson** as Vice-President in charge of the Automotive Division has been announced.

**Motor Products Corp.**—**L. G. Jacques**, formerly Vice-President and General Manager, has been made Executive Vice-President. **D. J. Bracken** is Vice-President and General Manager of the Automotive Division and **L. J. Sorensen** is Vice-President and General Manager of the Deepfreeze Appliance Div. at North Chicago.

**The DeVilbiss Co.**—The following promotions have been announced by **Howard A. DeVilbiss**, President. **William A. Delger** Vice-President in charge of manufacturing; **Don J. Peepe**, Chief Engineer, has been advanced to Vice-President in charge of engineering; **John M. Robinson**, now Treasurer, has been elected Vice-President and Treasurer; **Frank R. Pitt**, the company's legal counsel, was named Secretary and **R. Miles Booth** Asst. Secretary and Asst. Treasurer.

**The Electric Heat Control Co.**—Appointment of **Kent D. Fullerton** as Sales Manager has been announced.

**The B. F. Goodrich Co.**—**Raphael G. Jeter**, General Counsel of the Company, has been elected to the position of Secretary and General Counsel.

**American Cladmetals Co.**—Announcement of the appointment of **Eugene A. Brunner** as Asst. Secretary and Treasurer has been made.

**Pennsylvania Salt Mfg. Co.**—**E. J. Kopecki** has joined the company as a sales service representative in the Special Chemicals Dept.

## Torsion Bar Suspension

(Continued from page 46)

Walcker pack, should make it possible to mount it within the two arms of a wishbone on independent suspension systems. Among the advantages claimed over the circular section bar are compactness and absence of machining, these tending towards reduced production costs. The Salter laminated torsion bars have not yet been adopted by any manufacturer, but are being tried out.

**costs more**

**cleans better**

**goes farther**

**saves money**

try a **PARCO**  
*formulated*  
**CLEANER!**

It costs more per pound. But it cleans better, goes farther, cleans more surface per pound of cleaner; it's an economical buy.

Parco Cleaners are specially formulated to clean and condition metal surfaces to provide a better base for finishes. They're formulated to reduce clean-

ing time, operating temperatures, and amount of cleaner used.

In the Parco Cleaner line there's bound to be one that's especially suited for your requirements. A production test with the Parco Cleaner that fits your need will save you money on cleaning. Write today!

### ● EMULSION AND SOLVENT TYPE

Excellent for removing oil, grease, and soil from metal surfaces. Spray and immersion types.

### ● ACID TYPE

Want to remove rust and scale from iron and steel? Here are cleaners to do the job off-cisly, economically.

### ● ALKALINE TYPE

A wide range of light and heavy duty, spray and immersion types, for removing oil, grease and soil from metal surfaces.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

**PARKER**

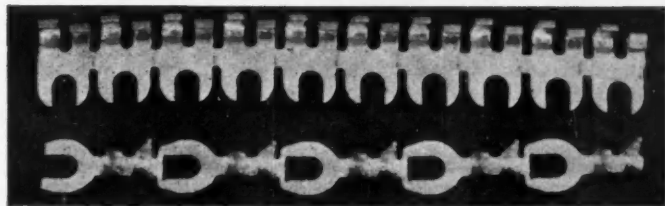
PARKER RUST PROOF COMPANY  
2170 East Milwaukee Ave.  
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BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces

# COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" Headquarters for BRASS, BRONZE and COPPER



Self-soldering tandem terminals are attached by machine which contains heating unit. Courtesy Patton-MacGuyver Co., Providence, R. I.

## Cutting Costs by Mechanizing Slow Hand Operations

Elimination of expensive hand operations is one of the important ways open to fabricators for substantially cutting costs.

This is always a challenge to the ingenuity of machine and product designers to develop methods for changing old-time hand operations to semi or completely automatic cycles. This may involve both the development of a special-purpose machine and the redesign of the product itself.

### Cutting High-Cost Soldering

The method for soldering copper terminals to insulated wires is an example of such cost-cutting. Originally the terminals were handled individually and required fluxing, tinning, bending and soldering with either an open flame or soldering iron.

The mechanization of this job involved the development of a machine to do the job automatically, with the exception of inserting the wires. It also required redesigning the terminals in strip form.

Progressive dies were made to blank, pierce and bend the terminals but not clip them off. This permitted tinning and depositing the solder on a mass production basis. The fact that the terminals remain joined until fed into the machine does away with the troublesome problem of hand feeding individual terminals which tend to tangle up.

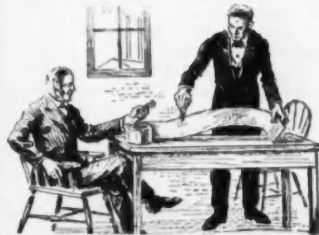
The machine feeds the roll of tandem terminals into a die. When the wire is inserted and the lever tripped, the die closes, cutting off a single terminal, bending the locking lugs around the wire and simultaneously applying heat to melt the solder. Instead of a few hundred by hand, the machine is capable of producing 1200 or more assemblies per hour.

### Copper-Base Alloys Can Help Cut Fabricating Costs

Copper, with its high electrical conductivity, is eminently suited for this job. It can be blanked, formed and clipped with minimum power.

It is extremely ductile which permits the cold bending of locking lugs around the wire without breaking. Copper's high heat conductivity makes it possible to heat the terminal speedily, and dissipate the heat rapidly when the current is shut off.

Product designers interested in cutting production costs will appreciate the fine workability and versatility of the copper-base alloys. Much valuable information on the characteristics of copper, brass, tin, bronze, silicon bronze and aluminum bronze can be gleaned from Bridgeport's Technical Handbook. Contact our nearest Bridgeport sales office for technical help on your metal problems.



## Did You Know...

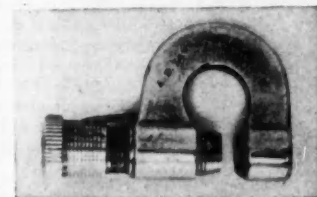
### Bridgeport Brass Developed First Mike?

It was 1867, two years after Bridgeport Brass was founded. The Union Metallic Cartridge Company (now Remington Arms) had returned a quantity of brass because it was "out of gauge".

S. R. Wilmot, superintendent, applied his "finger" gauge on several rolls and stoutly denied the charge. However, the customer's gauge did not agree with Mr. Wilmot's, or with a third.

Mr. Wilmot then took matters into his own hands and called in Mr. Laws, of the Mechanical Department. He demanded a gauge with a calibrated moving part that would measure thicknesses accurately.

Meeting emergencies was nothing new to Bridgeport Brass and soon the first "mike" was born. Mr. Laws made five more to fulfill requests from most important customers, but when more were called for, he rebelled. The firm of Joseph R. Brown and Lucian Sharpe was asked to take this task off his hands.



Granddaddy of the micrometer caliper—designed and made by Bridgeport Brass in 1867.

With some minor modifications in the method of reading, the micrometer caliper of today is essentially the same as the one which Bridgeport developed for its own use in 1867.

Industry is indebted to Bridgeport Brass for this universal instrument of precision.

BRASS • BRONZE • COPPER • DURONZE — STRIP • ROD • WIRE • TUBING

MILLS IN  
BRIDGEPORT, CONNECTICUT  
INDIANAPOLIS, INDIANA

In Canada:  
Noranda Copper and Brass Limited,  
Montreal



BRIDGEPORT BRASS COMPANY  
BRIDGEPORT 2, CONNECTICUT  
Established 1865

"Bridgeport" District Offices and Warehouses in Principal Cities

## Experimental Underdrive and Overdrive

(Continued from page 39)

regular transmission to step down all transmission gear ratios by 1.45 to one when desired. For instance, a two to one reduction in the transmission would result in practically three to one with the underdrive in low ratio. The normal input shaft of the gearbox is extended forward into the clutch shaft which carries and drives an internally toothed annulus, within which are planet pinions mounted on a carrier fixed to the gearbox input shaft. There

is a sleeved sun pinion on this shaft which completes the epicyclic train. The sun pinion is free, but is prevented from running backwards by an over-running clutch. It carries a double cone clutch sliding on splines cut in the sleeve.

The planet carrier being integral with the gearbox input shaft, the drive through it into the box is at a lower speed than engine crankshaft speed. Direct drive is obtained by pushing the

cone clutch forward by the use of an integral hydraulic system, so that it engages with the coned periphery of the annulus, the mechanism turning as a unit, and the gearbox input being driven at crankshaft speed.

A cam-operated punger pump is used to build up hydraulic pressure in an accumulator, from which oil can be admitted to two cylinders which push the cone clutch against its springs when a ball valve is opened. Actuation of the ball valve can be either manual or by a solenoid.

The four speed transmission is a combination of two units in tandem, with different ratios. With both units in low, first gear is obtained. One unit in low and the other direct gives second gear, and a reversal of this gives third gear. High is obtained when both units are in their direct ratios. All changes are made hydraulically. Reverse is provided by a sliding dog forward-and-reverse unit.

A somewhat similar unit can be fitted to the rear of a transmission to serve as an overdrive. When so used, the De Normanville device provides a ratio of 0.82 to one. To provide overdrive instead of underdrive, the transmission output shaft drives the planet carrier while the internally toothed annulus is integral with the output coupling shaft. This is the reverse of the underdrive arrangement so that when overdrive is desired the hydraulic mechanism retracts the cone clutch into engagement with a fixed drum, the sun wheel is held motionless, and the planet carrier drives the annulus at a higher speed than the transmission output shaft.

An overdrive unit of this type is now being tested in England on a Standard Vanguard model car.

### Which of These **ROCKFORD CLUTCHES**

**Will Solve Your  
Power Control Problem?**

Avoid the waste of trial-and-error testing. A letter or phone call to our engineering department will save you weeks of vital time and give you the benefit of their quarter-century of experience transmitting and controlling power—with clutches. Their know-how, plus a wide range of clutch types and sizes to choose from, will help your engineers specify the **RIGHT** clutch for **YOUR** product.

**ROCKFORD CLUTCH DIVISION**

**BORG-WARNER**

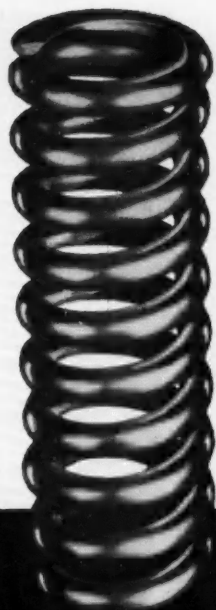
**315 Catherine Street, Rockford, Illinois**

## AIRBRIEFS

(Continued from page 38)

temperatures require special materials and insulation from the airframe. When a flame holder (grid across tailpipe to create turbulence for burning) is used—as is usually the case—its drag reduces engine output when the afterburner is not being used. Biggest problem, however, is the fact that the afterburner increases the fuel consumption about 2½ times, rendering it a short-time operating unit only. For this latter reason, the services have evolved numerous complex operational plans for afterburner aircraft, such as use during takeoff and climb, use only while making an attack, use only while maneuvering at very high altitudes, etc. Many evaluations have been made of the practicality of constant afterburner use, with resulting severe restriction on aircraft endurance. But apparently the services feel this consumption penalty well-worth paying in

(Turn to page 92, please)



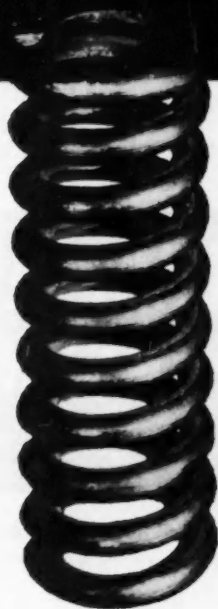
# How much should a spring cost?

● It all depends on the job it has to do. Because *overdesign* is just as bad as *underdesign*. You lose both ways—the end product either performs poorly, or it costs too much.

When costs are important, and they usually are, we don't believe in designing springs with unnecessary, elaborate and costly performance characteristics. We don't recommend stainless or high alloy steels if carbon steel will do the job. And we're quick to suggest ways to simplify springs—and cut their cost. You can be sure that, whenever it's possible, our designs will utilize the lowest cost material and fabrication methods that will do a good job for you.

Let our engineering staff—our comprehensive production and testing facilities go to work for you. You'll get a better spring—at a price—that will fit your needs *exactly*.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO  
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS  
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS  
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



## AMERICAN QUALITY SPRINGS

UNITED STATES STEEL



whatever your product  
whatever your problem  
specify . . .

**BLAKE &  
JOHNSON**  
*Fastenings*

**THE BLAKE & JOHNSON COMPANY, WATERTOWN 48, CONN.**

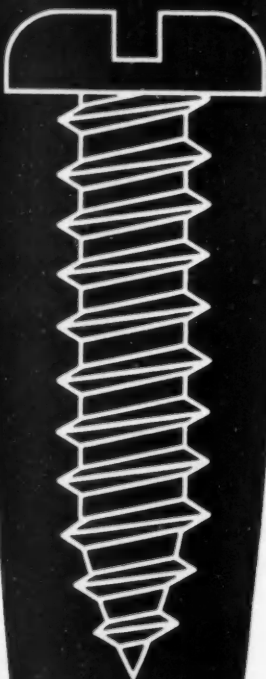
Please send me your  
new catalog containing  
full data on the com-  
plete line of Blake &  
Johnson fastenings.

Name .....  
Title .....  
Company .....  
Address ..... AI-2

1849

Slotted or Phillips head machine screws, wood screws, stove bolts, tapping screws, special beaded products, nuts, rivets, chaplets, wire forms, screw machine products . . . in steel, stainless steel, copper, brass, bronze, everdur, nickel, nickel silver, monel, aluminum.

1950



exchange for the 50 per cent increase in rate-of-climb and 10-25 per cent increase in maximum speed it provides. All new-design in both services, including bombers and attack planes, specify afterburner installations.

### Action—Perhaps

We recently joined in the popular sport of excoriating President Truman —this time on his peremptory withdrawal of \$800 million of Air Force procurement funds legally provided by Congress. Comes now the House Armed Services Committee with a report accusing the administration of usurping the constitutional authority of the Congress to "provide for the common defense." It appears to many observers that the Truman-Johnson-Matthews administration of national defense is treading dangerously close to the historically fatal "rule by men" instead of our constitutional "rule by law." We think it a little silly to order an all-out national effort to build a hydrogen bomb while simultaneously restricting the Air Forces to an arbitrary and dangerously low strength. It is to be hoped that the House Armed Services Committee will go a step further from issuance of a report and press home its conviction that the people and not Harry Truman —will decide how big an Air Force they want, in accordance with the Constitution.

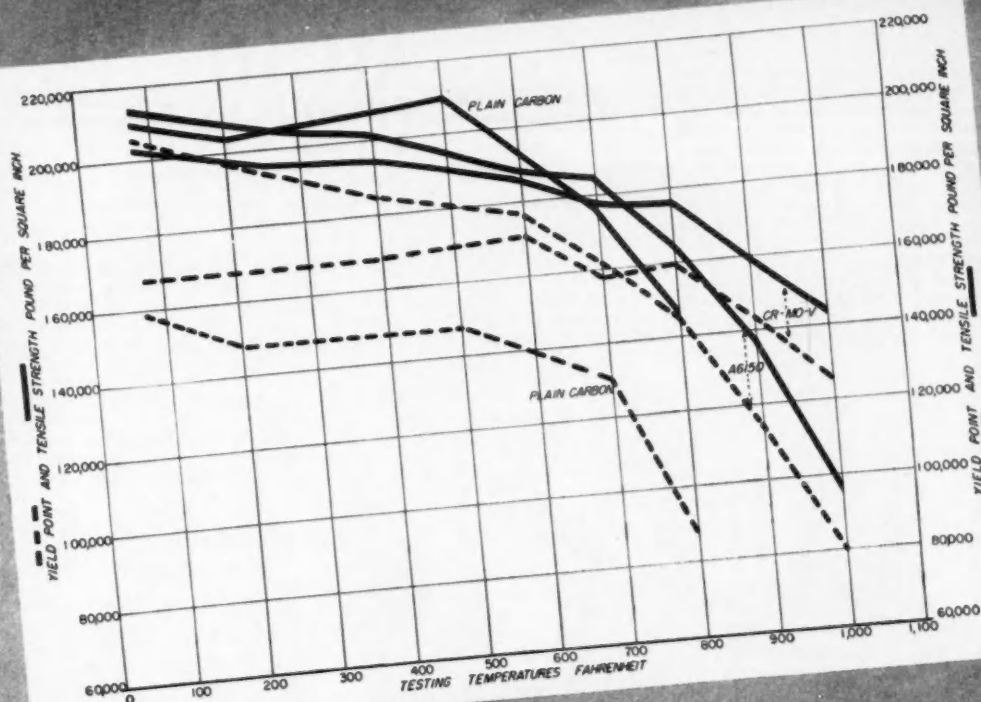
### Hot Skinning

(Continued from page 41)

of tension straps which would maintain continuous tension on panels until riveted to the structures. In each case, the large sheet was placed horizontally over the structure, tension straps and bars applied and heating blankets placed over the area to be heated and boxed-in. When the temperature of the heated area reached equilibrium, holes were drilled and rivets installed in approximately every fourth rivet location around the periphery of the heated area. The heating blankets were used to maintain the heated area at temperature until all preliminary riveting was completed, then moved to an adjacent area. Each completely riveted panel was finally trimmed using a sharp tool to scribe a deep mark along the trim line. The excess material was then broken off by bending. Burred edges were filed smooth and painted with zinc chromate primer.

The process of "hot-skinning" or covering as described above will yield good results providing the recommendations are followed and consideration given to differences in assemblies as to design, size and rigidity. While a few "oilcans" existed in the panels between ribs of some of the large assemblies covered, their cause could in

(Turn to page 94, please)



## HIGH TEMPERATURE PROPERTIES of Cr-V and Cr-Mo-V Spring Steels

**S**PRINGS FOR SERVICE at elevated temperatures require steels which resist softening and lowering of the yield point. Unless hardness and yield strength are stabilized by correct alloy additions to the steel, these properties deteriorate rapidly as the temperature is raised.

The chart above shows the yield point and tensile strength of three types of spring steel at elevated temperatures determined by standard short-time tension tests.

Springs of plain carbon steel are sometimes used at moderately elevated temperatures, although their lower yield values prevent them from giving service as satisfactory as that of the alloy spring steels.

Chromium-vanadium steel springs, such as AISI 6150, give better service at ordinary temperatures because of the higher yield point. In addition, they may be used at operating temperatures up to about 700° or 750° F

because they retain high yield point values as the temperature is increased.

Chromium-molybdenum-vanadium steel was especially designed for springs operating at temperatures in excess of 750° F. It can be used for springs operating at temperatures as high as 850° F or even higher under some conditions. At 800° F, the yield point of this steel is still greater than that of plain carbon steel at room temperature.

If you have a problem in spring applications at elevated temperatures, our metallurgical engineers will be glad to help you solve it.

MAKERS OF  
ALLOYS



CHEMICALS  
AND METALS

## VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • DETROIT • CHICAGO • CLEVELAND • PITTSBURGH

each case be determined and corrective action taken, such usually being due to carelessness. Worthy of note is that thermostats had to be installed on the heating blankets to control their temperature and decrease the amount of sheet expansion and residual stress after cooling.

Both magnesium and aluminum sheeting can be used when "hot-skinning," however, aluminum being the harder material, it is more difficult to work with and use without resultant "oilcans" and lack of tautness. It is therefore advisable to apply greater mechanical tension to the panels than is required for magnesium.

# NEW PRODUCTS

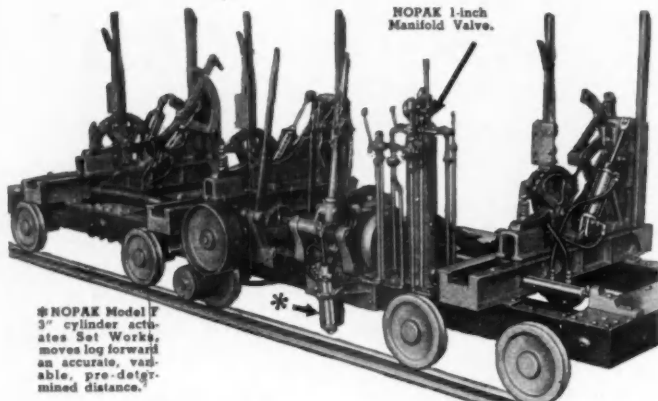
For additional information regarding any of these items, please use coupon on page 56

(Continued from page 80)

from 290 to 2300 rpm at rated output, and as low as 80 rpm for short periods or at light load, the drive provides

stepless speed selection and adjustment. When used with Reliance gearmotors, ranges of lower speeds are available.

The drive consists of a drive motor supplied in ball bearing type, drip-proof, enclosed, fan-cooled, or explosion-proof construction for connection to the driven machine; an operator's control station furnished in conventional NEMA No. 1 enclosure; and a newly-designed control unit providing controlled electronic rectification.



\*NOPAK Model F 3" cylinder actuates Set Works, moves log forward an accurate, variable, pre-determined distance.

NOPAK 1-inch Manifold Valve.

## WHELAND LOG CARRIAGES Feature Bosses, Hammer Dogs and Set Works Operated by NOPAK Cylinders

A pioneer builder of sawmill equipment . . . the Wheland Company, Chattanooga, Tenn. . . recently converted its sawmill carriages from manual to air operation by the application of NOPAK Air Cylinders and Valves to certain machine movements. Mill operators report increased production, lower costs, better workmanship. Very likely the efficiency of machines which you build or use can be stepped up substantially through the correct use of NOPAK Valves and Cylinders . . . Air or Hydraulic. Write for NOPAK Application Manual.



Hammer Dogs are operated by 3" NOPAK Model E Air Cylinder for oscillating movement.



NOPAK Model E, 3" Air Cylinders are also used to actuate Air Boss Dogs as pictured here.

GALLAND-HENNING MFG. CO.  
2774 SOUTH 31st STREET  
MILWAUKEE 15, WISCONSIN

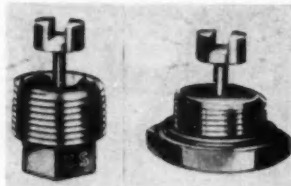
Representatives in Principal Cities

# NOPAK

VALVES AND CYLINDERS  
DESIGNED for AIR and HYDRAULIC SERVICE

A 5679-1/2-A

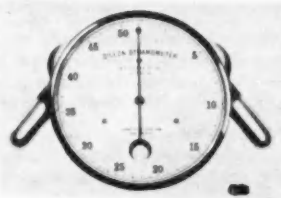
## K-58—Magnetic Drain Plugs



Magnetic drain plugs for crankcase, transmission and rear axle, offered by the U. S. Plug & Fitting Co., Cleveland, Ohio, attract abrasive ferrous particles directly from the oil or lubricant stream, not merely attracting those particles that normally settle. Plugs incorporate high energy sintered permanent "Alnico" magnets of sufficient power to attract more than 10 times their own weight. Plugs are said to exhibit no dissipation or leakage of magnetic force, therefore requiring no replacement. Plugs are made to S.A. . . an original equipment standards and are threaded with "Dry-seal" threads.

## K-59—Traction Dynamometers

Added to their line of precision testing devices are 30,000, 40,000 and 50,000 lb capacity traction dynamometers



Dillon high capacity traction type dynamometer capacity, 50,000 lb



## "TOOLED UP" FOR EFFICIENT PRODUCTION

Whenever you see a line-up of Clearing presses like this one in the Studebaker plant at South Bend, you know the management is going after profits by aggressive production. Indeed, with competitive conditions putting effective restraint on selling price, you've got to hold costs down if you expect to get volume business.

As Studebaker and so many other leading manufacturers know, they'll get top production efficiency from

Clearing presses. Accurate stampings, thanks to Clearing precision, will assemble easily and contribute to lower costs all down the line.

Because these are provable facts, you'll find more and more of the world's stamping work—large and small—being done on Clearing presses. Let us show you how a Clearing press, or several of them, can step up production efficiency in your plant. It costs you nothing to consult our engineers.

## CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

**CLEARING MACHINE CORPORATION**

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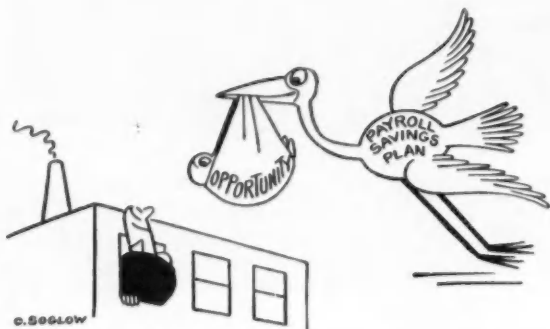


# NEW PRODUCTS

For additional information regarding any of these items, please use coupon on page 56

put out by W. C. Dillon & Co., Inc., Chicago, Ill. The new instruments may be used indoors or outdoors in checking drawbar pull, weight of bulky objects, tension on ropes or cables, static

loads, etc. Diameters are 10 in. compared to about 5½ in. for the company's present Model AN line, and calibrated for easy reading and fine increment breakdown. Etched figures



## Put more opportunity into your company's future

### WITH THIS FIVE-STEP PROGRAM

Here's a program that will increase your company's chances for a prosperous future.

Experience of 20,000 companies proves this program also pays off handsomely today. It makes each participating employee a more contented, more productive worker. It reduces absenteeism, lowers accident rates, increases output, and improves employee-employer relations.

#### What Are the Five Steps?

Nation-wide experience indicates that 50% of your employees can be persuaded to join without high-pressure selling. Here are five steps

which have proved to be the "magic formula" for putting over the Plan. They will get results for you:

1. See that a top management man sponsors the Plan.
2. Secure the help of the employee organizations in promoting it.
3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Plan's benefits to them.
4. Make a person-to-person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

All the help you need to follow this five-step program is available from your State Director, U. S. Treasury Department, Savings Bonds Division. Call him now. Or write the Treasury Department, Washington 25, D. C.

#### Are You With It?

In the Savings Bonds campaign, May 16-June 30, the Treasury Department asks you to canvass all your employees, with the goal of having at least half of them on the Payroll Savings Plan by June 30th.

The Treasury Department acknowledges with appreciation the publication of this message

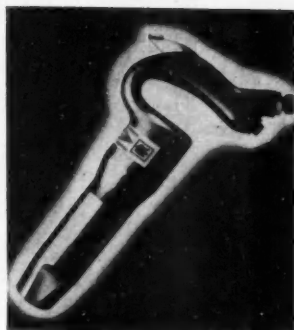


This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and The Advertising Council.

are not affected by heat or fumes. Inside dimensions of shackles are 3¾ in. long by 2 in. wide, designed to fit most standard hooks. Weight of instrument including shackles is 25 lbs.

## K-60—Metal-Chipping Hammers

A line of chipping hammers based on a new design to meet the exacting cutting conditions imposed by present-day metals has been brought out by Ingersoll-Rand Co., New York, N. Y.



Ingersoll-Rand controlled power chipping hammer

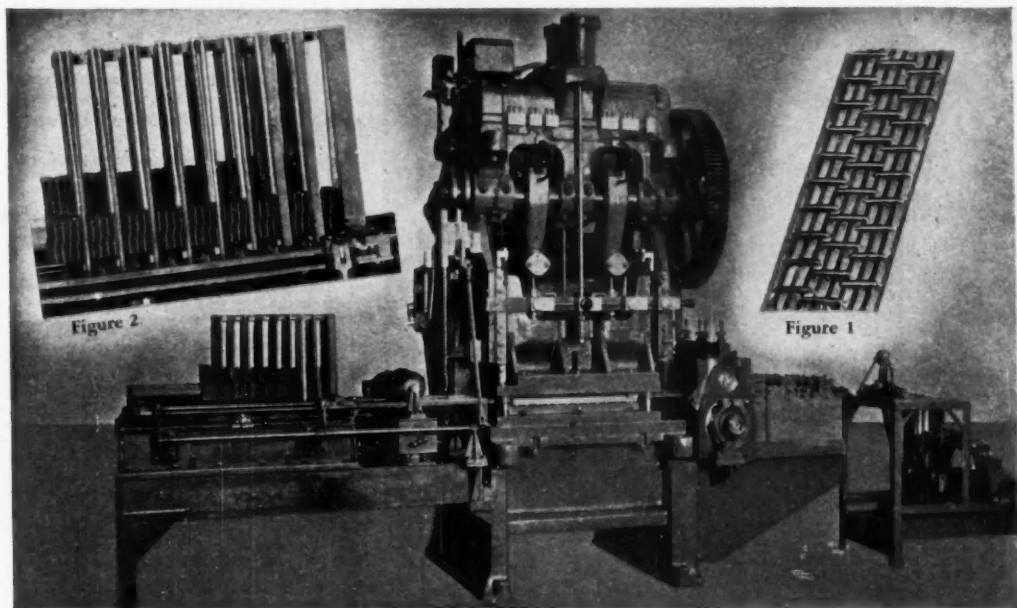
known as the controlled power chipping hammer line. A selection of 15 power sizes (with 5 basic hammer sizes) to meet all requirements is offered. Each basic hammer size is available in normal-cut, extra-cut, or super-cut type, made possible by design variation in one part interchangeable throughout the whole line.

Through the new hard-surfacing Iramet process used by Ingersoll-Rand, piston life is said to have been increased 12.3 times. Other important parts of controlled power chipping hammers subjected to wear are also plated with Iramet. The new Airite valve proportions the air fed to the front and rear of the piston to maintain top cutting efficiency, provides smooth flow of full power, and eliminates short stroking and loss of power on heavy cuts, the company states.

Weight distribution and comfortable handles enable operators to work with greater speed, less effort and minimum fatigue, three types of handles, each locking into place in a positive manner.

## K-61—Thickness Gage

A special-purpose Magne-Gage for measuring thickness of nickel coatings on iron or steel in the range of 0.001 to 0.0045 in. by magnetic means, without injuring the coating or base metal, is a product of the American Instrument Co., Inc., Silver Spring, Md.



## CLEVELAND press *stacks up* 120 fins a minute

120 automobile radiator fins are stacked up per minute as raw metal is uncoiled, corrugated, punched and sheared *automatically* by a leading automotive parts manufacturer using this new Cleveland Press fabricating unit.

Two strips of metal are pulled through the beading and corrugating coils by automatic coil feed. Then they are fed into the Press, which is single geared and equipped with a single station electrically controlled Cleveland Drum Type Friction Clutch. Here they are punched and sheared to length as in Figure 1. Rotating brushes pass the completed fins to the stacker where they are collected in two piles (see Figure 2).

Selecting the right press from Cleveland's wide variety of sizes and types was easy. The tough problem was how to stack the rough surfaced fins. Cleveland engineering ingenuity solved this by stacking *from the bottom* while the load is held in a raised position by a set of elevator fingers. Finished stacks can be readily removed without disturbing press operation.

If you have a production problem demanding greater press efficiency, be sure to investigate the Cleveland line. One of the many sizes and types available will undoubtedly meet your requirements. Cleveland engineers will gladly work with you on special problems.

A-5716

THE  
**CLEVELAND**  
PUNCH & SHEAR WORKS CO.  
U.S.A.

Established 1880

..... POWER PRESSES .....

**PUNCHING TOOLS & DIES**

OFFICES AT:  
NEW YORK... CHICAGO  
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PITTSBURGH

**FABRICATING TOOLS**

CLEVELAND 14, OHIO

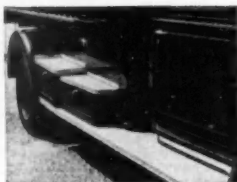


For greater safety under foot,  
in your plant and on your products

# Inland 4-Way Safety Plate®



**Easy Assembly**



**Safe Footing**



**More Traction**



**Adds Strength**



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**New Bulletin with New  
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Send for it!**

STOCKED BY LEADING STEEL WAREHOUSES

## Business in Brief

Written by the Guaranty Trust  
Co., New York. Exclusively for  
**AUTOMOTIVE INDUSTRIES.**

General business activity declined slightly during the week ended Jan. 21. Department store sales, railway freight loadings, and bituminous coal production were lower than in the preceding week, while electric power production, crude oil output, and construction increased. The *New York Times* index of activity for the week ended Jan. 21 stands at 150.9, as compared with 153.9 in the preceding week and 154.7 a year ago.

Sales of department stores during the week ended Jan. 21, as reported by the Federal Reserve Board, equaled 230 per cent of the 1935-39 average, as compared with 233 in the week before. The volume of sales showed no variation from the corresponding distribution in 1949, as against a preceding decline of five per cent. The total in 1950 so far reported is five per cent less than the comparable sum in 1949.

Electric power production increased contraseasonally during the week ended Jan. 21. The output was 4.7 per cent above the corresponding amount in 1949, as compared with an advance of 5.3 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 618,950 cars, 1.9 per cent less than the figure for the week before and 12.8 per cent below the corresponding number recorded in 1949.

Crude oil production in the week ended Jan. 21 averaged 4,962,300 barrels daily, 37,500 more than in the preceding week but 510,550 under the comparable output a year ago.

Production of bituminous coal and lignite during the same week is estimated at 7,260,000 net tons, 160,000 less than the output in the week before and 4,200,000 below the corresponding quantity in 1949.

Civil engineering construction volume reported for the week ended Jan. 12, according to *Engineering News-Record*, was \$216,406,000, or 19 per cent more than the preceding weekly figure and two per cent above the comparable sum in 1949. The total recorded for four weeks of this year was 62 per cent more than the corresponding amount in 1949. Private construction for the period was 86 per cent above that a year ago, and public construction increased by 45 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Jan. 24, at 150.7 per cent of the 1926 average, was 0.1 per cent less than in the preceding week and was 5.5 per cent below the corresponding figure in 1949. Small declines were registered in all major commodity groups, with the exception of building materials and metals and metal products, which showed no variation.

Member bank reserve balances decreased \$68 million during the week ended Jan. 25. Underlying changes thus reflected include increases of \$158 million in Treasury deposits with Federal Reserve banks, \$30 million in non-member deposits and other Federal Reserve accounts, and \$6 million in Treasury cash, accompanied by decreases of \$82 million in Reserve bank credit and \$208 million in money in circulation.

Total loans and investments of reporting member banks increased \$313 million during the week ended Jan. 18. An advance of \$4 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$15,861 million, shows a net decrease of \$1553 million in 12 months.

## "Joe's A Good Man!"



In your organization you probably have a man that fits that statement. His name may not be Joe, but he's alert, dependable, careful, uses his experience nicely blended with imagination and cooperates like a young politician at his first caucus. Those qualities make him a valuable man.

Require those qualities in your suppliers, too. THE STANDARD PRODUCTS COMPANY has developed them during nearly two decades as dependable suppliers to the manufacturers of the nation's finest motor cars and trucks.

You always get STANDARD'S outstanding engineering cooperation and reliable service when you specify any PRODUCT BY STANDARD — Door locks, checks and remote controls . . . rubber parts and sections . . . thermo-plastics accessories and fittings . . . and famous STEECHAN glass-run window channel and weatherstrip.

THE MARK OF A



SUPERIOR PRODUCT

# *The Standard Products Co.*

EXECUTIVE OFFICES — 2130 W. 110th ST. CLEVELAND 2, OHIO

SALES OFFICES — 316 FISHER BLDG., DETROIT 2, MICH.

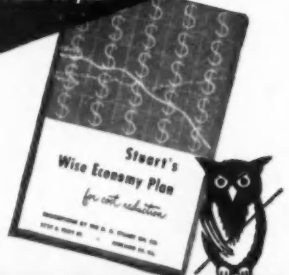
Plants Located in Port Clinton, Ohio; Cleveland, Ohio; St. Clair, Mich.; Gaylord, Mich.; Long Beach, Calif.; Windsor, Ontario

# REDUCED MACHINING COSTS RESULT FROM WISE SELECTION OF CUTTING FLUIDS

## STUART'S WISE ECONOMY PLAN provides the method

Not just another spot check "oil survey," the Stuart plan is a scientific appraisal of a plant's over-all needs coupled with practical suggestions and followed through with a continuing technical service.

Ask to have a Stuart Representative explain the WISE ECONOMY PLAN to you.



**D.A. Stuart Oil Co.**

2733 S. Troy St., Chicago 23, Ill.

## New British Racer Super Speed Engine

(Continued from page 54)

Distinctive departures from European racing practice is central drive for the two-stage centrifugal blower, developed in collaboration with Rolls Royce, and for the four overhead camshafts. The engine is treated as two V-8's, each with a four-throw crankshaft and five main bearings, with central gearing for camshaft operation. Previous to this attempt, centrifugal blowers have not been used on any European racing cars, but a good range of efficiency is claimed for the one adopted. The blower is geared up about 3.5 to 1 in relation to the crankshaft. Planetary gears are used for supercharger drive, with two transverse shafts operating oil and water pumps.

Up to the present the engine has been operated on two S. U. carburetors, but the design provides for direct injection of fuel into the supercharger. Ignition is through four coils and four distributors—one at the front end of each camshaft. A small battery carries enough current for a race. Exhaust valves are sodium cooled. Two hairpin springs are used for valve closing. It is claimed that these have operated successfully up to 18,000 rpm. Main and connecting rod bearings are copper-lead with steel backing. The camshafts are carried in roller bearings.

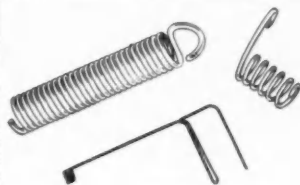
A novel feature is a separate base chamber below the crankshaft in which there is a power take-off from the central gears. This shaft runs at practically half engine speed and carries the drive to five-speed transmission combined with the De Dion type rear axle. Front wheels are independently sprung on trailing arms of the Porsche type. Chrome molybdenum steel tubes are used for the side rails. Brakes are Girling three-shoe type with Lockheed hydraulic application. It is believed that at least one of the cars will be ready for international racing in 1950.

France has scrapped her plans for building a set of national racing cars, after having met with failure in two successive years. Designed by Engineer Lory, formerly responsible for Delage cars, the national jobs far exceeded weight estimates and although the engine gave satisfaction, there was a lack of harmony in the general design. Lory has been transferred to the engine department of the State-owned Renault factory.

The British effort, which is being sponsored mainly for its propaganda value, will have to meet private Italian competition, mostly from Ferrari and Maserati, with a possibility of Alfa Romeo. No support is given by the Italian Government or by the Italian industry as a whole.

## "Springs are Springs"

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for most people  
... but NOT  
for ACCURATE



HOW often have you heard a spring user or even a manufacturer say "Springs are springs, what difference who makes them if the price is right?" Here at Accurate, we think it makes a big difference and our experience proves it. *Exact* conformance to specifications can be mighty important if it means easier, faster assembly and better performance for your product. Quality control is important, too, when it saves you time and trouble. "Know-how" and facilities for making springs the least costly way can mean many dollars for you.

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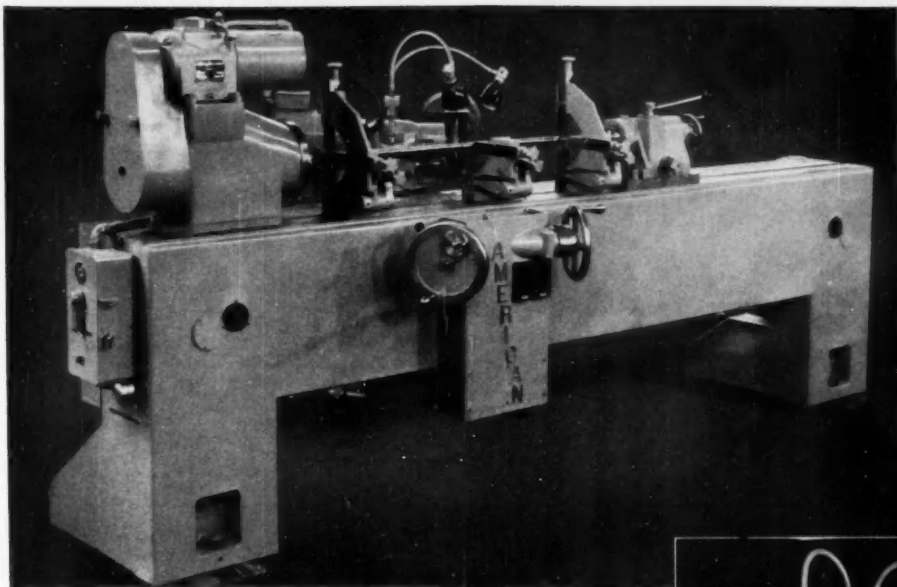
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**ACCURATE SPRING MFG. CO.**

3810 W. Lake St. • Chicago 24, Ill.

*Springs, Wire Forms, Stampings*

• Fixed Broach • Traveling Wheel . . . the *American* way to Better Broach Resharpener



## The NEW *American* ROUND BROACH SHARPENER *Can Give You These Advantages*

- Time Saved Through Faster Resharpener
- Money Saved By Fewer Resharpener
- Part Cost Lowered By Better Resharpener

The new American Round Broach Sharpener is designed to make possible fast, highly accurate broach resharpener in your own plant. It is speedy, efficient, needs no highly skilled operator.

American designed the new RBS to overcome broach vibration which results in an inferior job. The broach is rotated between fixed centers, while the carriage mounted grinding spindle is traversed from tooth to tooth.

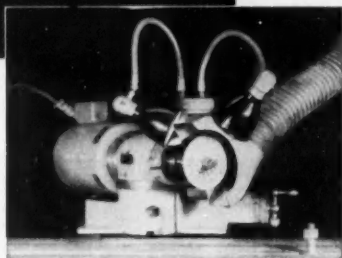
Here's what you get with this NEW idea:

1. The broach is supported above and between the pedestals. It never extends beyond the bed. This solid support minimizes vibration, improves resharpener. 2. Machine is more durable because there is less wear on

vital ways with the ball-bearing mounted carriage always in full contact — never extended. 3. Resharpener is faster, and more accurate because efficient design relieves operator from mental and physical fatigue. 4. Minimum floor space required because no traveling members extend beyond the bed length.

The RBS has been thoroughly tested, for over a year in actual use, in the plant of one of the largest users of broaching in the country. It has proven highly successful. It saves time in broach sharpening, and gives a better sharpening job.

The American Round Broach Sharpener is now available in two models to sharpen cylindrical broaches up to either 60" or 84" in length and up to 9" in diameter.



Model RSB9-84. Insert shows grinding spindle.

### FEATURES of the *American* Round Broach Sharpener

- Sturdy Construction
- Heavy Ribbed Cast Iron Bed and Pedestals
- Full Between Pedestal Support
- Simple Manual Control
- All Controls Mounted on Carriage
- Cast Aluminum Carriage Ball Bearing Mounted on Hardened and Ground Rails
- Micrometer Dial and Rapid Traverse Lockout on Left Handwheel
- Right Handwheel Controls Infeed
- Variable speed (100-500 RPM) Transmission
- Graduated Face Plate
- Quick Release Variable Tension Spring Loaded Tailstock

Write for complete informative Circular  
No. 800. Please address Department I.



**American** BROACH & MACHINE CO.  
A DIVISION OF SUNSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



# FAST ON-THE-SPOT REPAIRS With This Portable Welder!



This inexpensive "Lincoln Welder", made by Lincoln Electric Co., Cleveland, O., is easily mounted on running gear or truck for welding service anywhere.

Welding at the breakdown-scene . . . adds up to savings in time and labor with this light but rugged 180 amp. Lincoln Welder, powered by a two-cylinder Wisconsin Heavy-Duty Air-Cooled Engine.

The performance satisfaction of Wisconsin Engine power increases not only the reliability of equipment in all fields, but also increases the confidence of both equipment user and builder. They're sold on such features as self-cleaning, thrust-absorbing Timken tapered roller bearings at both ends of the crankshaft . . . fool-proof air-cooling, from sub-zero to 140° F . . . an easily serviced OUTSIDE rotary type, high tension magneto with impulse coupling, for quickest any-weather starts . . . plus heavy-duty construction, inside and out.

Your investigation is invited! 3 to 30 hp., 4-cycle single-cylinder, 2-cylinder, and V-type 4-cylinder models.

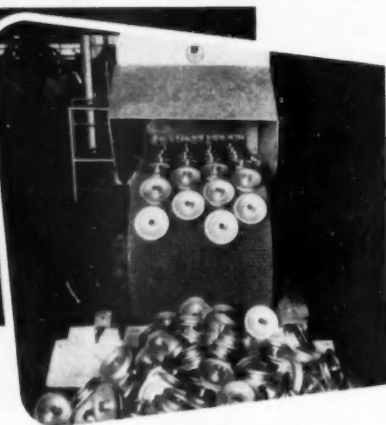


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or Electric —



### cut material, tooling and finishing costs

● For instance, brazing a disc on the end of a tube may use 75 to 80% LESS material than if the hollow flanged part is cut from the solid. Finishing costs are low too, because the assemblies are discharged smooth and scale-free.

Brazing also avoids localized overheating, distortion and the cost of straightening. It's ideal for most any size, shape or quantity requirement.

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GAS FIRED, OIL FIRED AND ELECTRIC FURNACES  
FOR ANY PROCESS, PRODUCT OR PRODUCTION

*Salem - Ohio*

## Publications Available

(Continued from page 56)

torque converter fluid, etc. Dimension tables for single and two pass coolers are included in the bulletin.

### H-45 Aluminum Extrusions

Reynolds Metals Co.—The basic engineering principles that will enable the designer to use extruded aluminum shapes most effectively are well explained and illustrated with many examples in a new 138-page book, "Designing with Aluminum Extrusions," which breaks down the advantages of the extrusion process into eight principles of design. Then each of these is illustrated and explained in detail by use of diagrams, charts and pictures of actual parts.

### H-46 Line of Machine Tools

Cincinnati Milling and Grinding Machines, Inc.—A new general catalog describes and illustrates machines for milling, broaching, cutter sharpening, grinding, lapping and flame hardening. Cimcool, a multi-purpose cutting fluid, also is described in this 47-page catalog.

### H-47 Grinding Machines

Cincinnati Grinders, Inc.—A 10-page bulletin, Publication No. G-594, describes and illustrates Cincinnati Filmatic 14-in. and 16-in. plain grinding machines. It points out high lights of design such as automatic wheel balancing, electronically controlled table traverse speeds, automatic headstock control and coolant flow, etc. Also included are dimensional drawings, specifications, and lists of standard and special equipment.

### H-48 Protective Oil

Oakite Products, Inc. — A 16-page, illustrated booklet providing descriptive data on Oakite Special Protective Oil, a material which is designed to give semi-permanent rust protection to metal parts during production, in storage or while awaiting shipment. Besides providing data on efficient anti-rust procedures, the booklet also features a special flow chart showing strategic points along the production line where this material may be applied effectively.

### H-49 Abrasive Belts

Minnesota Mining & Manufacturing Co. — A new "Step Up Production" (Turn to page 104, please)

# Reynolds weaves wire cloth for....



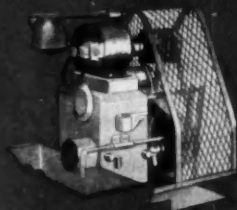
## GRADING

Slaker Screens grade Coals, Sands, Pitches, Aggregates and Fertilizers



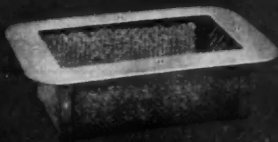
## FILTERING

Air Filters and Cleaners—Field Filtration and Cleaners rely on Reynolds Wire Cloth



## GUARDING

Wire Cloth protects Machines from careless hands, and keeps hands from machines



## STRAINING

Impurities in Engine Lubricants can wear out Moving Parts—Wire Cloth is the Ideal strainer



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Floor Filters—Vannadry Riddles and all Industrial Sifters

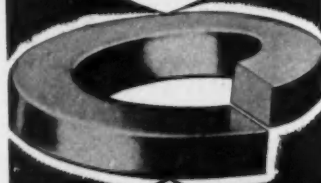
Whatever your wire cloth needs as to metal, weave, mesh, gauge or finish—Reynolds will weave it to your specifications. Consult Reynolds Engineers without cost or obligation.

**REYNOLDS WIRE CO.**  
DIXON, ILLINOIS



**Reynolds**  
*Industrial*  
**WIRE CLOTH**

## CONSTANT POWER ZONE



## DIAMOND G SPRING LOCK WASHERS

### Assure Longer Lasting Assemblies

The life of the assembly is usually determined by the length of the Power Zone of the fastening device. Diamond G Spring Lock Washers have been designed, developed and torture-tested to provide the maximum Constant Power Zone . . . longer positive holding power.

#### WASHER FOR EVERY NEED

Whatever your needs in spring lock washers, there's a Diamond G to answer it—high carbon steel, bronze, aluminum, stainless steel and monel metal spring lock washers finished or plated with cadmium, nickel, brass, copper or other finishes . . . plus the new Diamond G Aluminum Spring Lock Washer that combines lightness of aluminum with the strength and durability of steel.

Garrett also manufactures a complete line of flat washers, spring washers, springs, stampings, hose clamps, snap and retainer rings.



Write for your free copy of the technical booklet "Small Parts For Better Production."

**DIAMOND G PRODUCTS**  
Manufactured by  
**GEORGE K. GARRETT CO., INC.**  
Philadelphia, Pa.



booklet on the use of abrasive belts in industry provides 36 pages of case-history examples and technical data on grinding and polishing with abrasive belts. Abrasive belt techniques are described and pictured for a variety of materials. Also covered is the new "pre-finishing" technique, in which the usual process of steel-forming-and-then-polishing is reversed in order to achieve maximum production line speed.

### H-50 Complete Line of Shapers

Cincinnati Shaper Co. — Catalog No. N-5 covers the 25 shapers in the Cincinnati line. Dimensions and specifications are given in tabular form. Standard features and special equipment are described and illustrated.

### H-51 Hydraulic Tables

Baldwin Locomotive Works — A new 36-page edition of "Hydraulic Tables," Bulletin 300, includes capacities of hydraulic rams, displacements of single-acting plungers, steel pipe tables, etc. Also included are data on strength of structural materials, properties of sections, beam formulas, moments of inertia and their computation, coil spring design, conversion tables for measuring units, and other tables.

### H-52 Diesel Fuels and Lubricants

Sinclair Refining Co. — A 46-page booklet entitled "Diesel Engines—Fuels and Lubricants." The text is presented in simple language but at the same time it meets the needs of those who are particularly interested in more detailed technological explanations of the functions, capabilities and performance of specialized fuels, lubricants and additives.

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It has  
the data you  
will want.

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Available—Research engineer—35—married and family. Four years experience in fuels and lubricants development and testing with major oil company. Five years in engine development as chief research engineer. Experience in design and construction of special test facilities. Desires position in same or allied fields located in east or mid-west states. Box 86, Automotive Industries, 5601 Chestnut Street, Philadelphia 29, Pa.

Midwest manufacturer will diversify line. Will consider new products, in or out of automotive field. Address Box 85, Automotive Industries, 5601 Chestnut Street, Philadelphia 29, Pa.



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it comes  
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can you afford  
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the best?

A good fastener costs  
very little more to  
buy than an ordinary  
fastener.

But—anything but the  
best fastener can add  
costs in terms of  
assembly time and  
high reject ratio.

That's why it pays,  
for very little more,  
to buy good fasteners.

**Scovill Makes  
Good Fasteners**



**SCOVILL FASTENERS**

Hex Head Screws • Semi  
Tapping Screws • Standard  
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Headed Parts

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Scovill Manufacturing Co., Waterville 14, Conn.

New York • Detroit • Wheaton, Ill.
Los Angeles • Cleveland • San Francisco

# "How to"

## INSTRUCTIONS FOR BRAZING FITTINGS TO PIPE AND TUBING WITH EASY-FLO AND SIL-FOS

LOW-TEMPERATURE SILVER ALLOY BRAZING with EASY-FLO or SIL-FOS is extensively used for joining pipe and tubing. It makes assemblies that are strong, permanently leak-tight and maintenance-free, and is an extremely simple, low-cost process. Anyone who knows how to use an oxyacetylene torch can quickly become proficient. It is merely a matter of following the correct procedure as covered by the INSTRUCTIONS in this bulletin. These instructions apply to the brazing of fittings to both pipe and tubing. For simplification, only the word "pipe" is used. The procedure is exactly the same when brazing with EASY-FLO or with SIL-FOS.

### PREPARATION

#### 1. CUTTING AND FITTING

- a. Cut pipe to length. Make butt ends cut square. Use of a square and scoring tool on pipe cutter is recommended. Fig. 1.
- b. Remove burrs with a reamer or half-round file.
- c. Try pipe end in the fitting to be sure it has the proper clearance. Clearance should not be more than .005".
- d. Clearance should be uniform all around. Where necessary, round out pipe with a slant tool. Fig. 2. For joining the outside of steel pipe use a standard tubing, American or Beaver brand hand tool with cutting tool. Fig. 3.
- e. Scribe a line on pipe at a distance from the cut end equal to the depth of fitting socket plus 1". This line serves as a guide to make sure pipe is inserted full depth when assembled in the fitting. Fig. 4.

#### 2. CLEANING

- Surfaces to be joined must be free of oil, grease, rust or scales. Clean them as follows:
- a. Thoroughly oil fittings have a coating of oil or grease. The liberal application of carbon tetrachloride with a brush is an effective method of grease removal.
  - b. Clean socket of fitting and end of pipe thoroughly with emery cloth to remove rust and scales. Figs. 5 and 6.
  - c. Do not handle surfaces after cleaning.

in this new  
**BULLETIN 17**

**I**f you do any brazing of pipe and tubing with EASY-FLO or SIL-FOS—or want to know just what the process is like you will find this new bulletin helpful. It gives the procedure, step by step, for—cutting and fitting—cleaning—fluxing—supporting assemblies—heating and flowing the alloys—cleaning after brazing. It tells how to make vertical up, vertical down and horizontal joints.

**WRITE TODAY FOR A  
COPY OF BULLETIN 17**

## HANDY & HARMAN

82 FULTON STREET

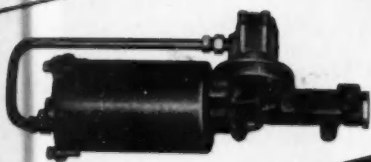
NEW YORK 7, N. Y.

Bridgeport, Conn. • Chicago, Ill. • Los Angeles, Cal. • Providence, R. I. • Toronto, Canada  
Agents in Principal Cities

# The NEW MIDLAND AIR HY-POWER BRAKE CONTROL

PROVIDES...

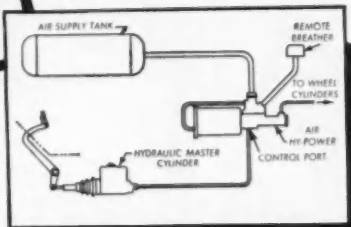
Air operation of your tractor by hydraulic brake and the control of your trailer air brakes by standard hydraulic-master cylinder.



**AIR OVER HYDRAULIC**  
in it's Most Simplified Form

- FEWER PARTS
- LESS WEIGHT
- DIRECT APPLIED POWER
- SEALED SYSTEM: Protected from atmospheric conditions—No mud, water, rust, dirt, corrosion—All moving parts enclosed.

- LONG LIFE—SIMPLICITY
- NO ADJUSTMENTS required in power unit.



Air Hy-Power piping diagram

## A NEW MIDLAND Development

Similar to the Vacuum Hy-Power unit. Comprised of three time-tested assemblies combined into a single device, using an air cylinder, a hydraulic cylinder and a portion of an air control valve. Nothing new except the combination.

- 1 Can be installed wherever convenient on vehicle
- 2 Eliminates air foot control valve
- 3 Not necessary to relocate master cylinder
- 4 Replaces air chamber power unit

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STEEL PRODUCTS COMPANY  
Detroit 11, Mich.  
6660 Mt. Elliott Ave.

Export Department: 38 Pearl Street, New York, N. Y.

### IMMENSE FACILITIES and EFFICIENT ORGANIZATION

At your service in Midland's vast plants in Cleveland and Detroit is outstanding engineering skill and gigantic productive capacity.



Air and Vacuum  
POWER BRAKES



World's Largest Manufacturer of  
AUTOMOBILE and TRUCK FRAMES



Air and  
Electro-Pneumatic  
DOOR CONTROLS



*here's how*

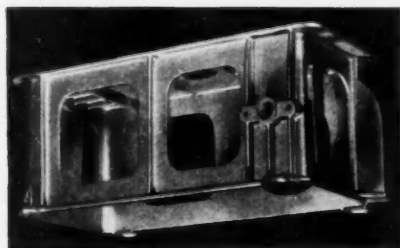
# MAGNESIUM DIE CASTINGS

*solve many problems.*

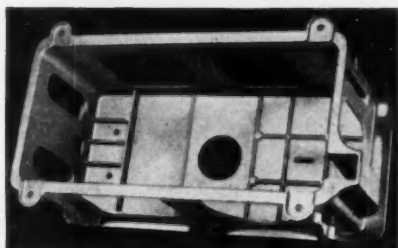
## Priced Competitively with other Materials!

You don't have to pay premium prices to get the many advantages offered by magnesium die castings. In most cases, magnesium die castings are priced competitively with those in other materials and in some cases they are cheaper.

Magnesium die castings are long past the experimental stage. A wide range of applications has proved magnesium a versatile and economically sound die casting material.



←  
Complicated  
Coring?  
→



## *Dow can do it in Magnesium!*

Complicated coring presents fewer problems with magnesium because magnesium die casting alloys do not solder to the die. The universal power tool base shown above was successfully cast in magnesium although product design requirements called for five moveable cores in the die! Magnesium's lightness and castability over large projected areas are also demonstrated in this casting. The over-all dimensions of the base are  $14\frac{3}{4}'' \times 5\frac{1}{2}'' \times 8''$ , yet it weighs only 37 oz.

There are many reasons for the growing acceptance of magnesium die castings. They do not "creep" or "grow"—better tolerances are obtainable. In many cases you can get better rigidity

with no weight penalty. Magnesium's extra lightness is a plus value. Any machining required can be done faster—magnesium is the easiest of all die casting alloys to machine.

When you design die castings, profit from the advantages offered by magnesium die casting alloys. Call in a Dow representative for expert assistance. Use Dow's production facilities for quality die castings at competitive prices.

*Write to Dept. MG-4*

### *Magnesium Division*

#### **THE DOW CHEMICAL COMPANY** MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Atlanta  
Cleveland • Detroit • Chicago • St. Louis • Houston  
San Francisco • Los Angeles • Seattle  
Dow Chemical of Canada, Limited, Toronto, Canada



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OF AUTOMOTIVE DATA  
FOR ITS 19,000 READERS

THE ONE MEDIUM FOR  
PENETRATING THE \$14 BILLION  
AUTOMOTIVE INDUSTRIES . . .

The  
**AUTOMOTIVE  
INDUSTRIES**  
32nd Annual  
**STATISTICAL  
ISSUE**  
*to be published*  
**March 15th**

The most complete source of data covering the automotive industries is now being prepared. Over 19,000 engineering, production, administrative and purchasing executives in 3112 automotive manufacturing plants will use this valuable issue extensively.

The 32nd Annual Statistical Issue will provide the latest data on automotive and aircraft production; registrations and sales totals; car, truck, bus, tractor, engine, aircraft specifications . . . and an abundance of other vital information automotive executives use to formulate their plans.

And . . . from their study of the advertising section, they learn of the leading suppliers of parts, materials, supplies, production and plant equipment. As proved by the Advertising Research Foundation's intensive readership study of **AUTOMOTIVE INDUSTRIES**, 75% of its readers influence purchases; 81% specify brands; 96% read the advertising.

**FINAL  
CLOSING  
DATES**

Color Forms  
March 1

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March 6

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- 1—"Do you keep the Annual Statistical Issue for reference?"
- 2—"How long do you use it?"

Here are the results:

Percentage of Readers who use it  
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**98.8%**

Percentage of Readers who use it the  
**YEAR 'ROUND**

**90.3%**

With evidence like this, it is sound business to invest your advertising dollars in the one medium that is used extensively by the \$14 billion automotive manufacturing field . . . the **AUTOMOTIVE INDUSTRIES** 32nd Annual Statistical Issue. Space reservations are being accepted now.

**AUTOMOTIVE INDUSTRIES**

A **CHILTON**  Publication

Chestnut and 56th Streets

Philadelphia 39, Penna.

**. . . the Automotive Industrial News Magazine**

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**T**HE installation of a Wean-Hallden Synchronized Automatic Shear Line assures you the most efficient shearing operation available today. The Wean-Hallden, while actually requiring less floor space, delivers up to twice the production.

Infinite variable lengths from 12-inches to 12-feet at speeds up to 200 FPM with accuracy better than commercial tolerances means faster production, reduced labor costs and minimum scrap loss for you. Before You Buy—Investigate Wean-Hallden.

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even more useful to you

we offer . . .

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covering all issues from  
July 1, 1949, to December 15, 1949, Inclusive**

The new AUTOMOTIVE INDUSTRIES Editorial Index is now available. It saves hours of searching for specific subjects covered in past editions.

This handy index provides you with a quick summary of ALL the editorial articles, listed alphabetically by subject, along with page numbers and dates of the issues in which they appear. Also includes a cross-index by author and company mentioned.

The supply is limited, so order your copy now by enclosing check or cash for 50 cents, with the coupon below. If, at the same time, you wish to order the index for the next 6-months' issues (January 1 to July 15, inclusive), enclose \$1.00. It will be sent upon publication.

**Mail coupon today to  
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INDUSTRIES**

**Chestnut & 56th Sts.  
Philadelphia 39, Pa.**



Please send me the new AUTOMOTIVE INDUSTRIES Editorial Index covering the 12 issues from July 1 to December 15, 1949, inclusive, for which I enclose 50¢. (I would also like to order the next 6 months' index, both for \$1.00, which I enclose). Forward index to:

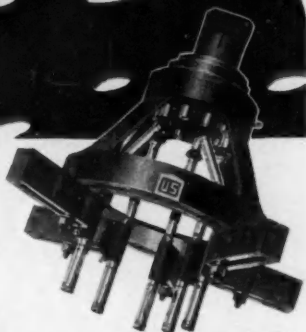
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# Figure the HOLE Cost!

**ADJUSTABLE  
MULTIPLE DRILL HEADS**  
Fit any machine, 2 to 10 Spindles.  
Save 2 to 10 Operations.



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## PRICES: 6" DRILLING AREA

	1/4 capacity 21/32 center	
U-1	3 Spindle Head	\$165.00
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5	"	176.00
6	"	187.00
7	"	198.00
8	"	220.00

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8	"	343.00
9	"	373.00
10	"	403.00

**IMMEDIATE DELIVERY!**

Also manufacturers of all types of fixed center heads

# UNITED STATES DRILL HEAD CO.

Dept. G, 616-618 Burns St., Cincinnati 4, Ohio

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Imagine, one machine doing all of these operations—seven models that work the finest gauges up to 11/32" (in mild steel). Also ideal for working stainless, non-ferrous metal, wire mesh. Leaves a smooth perpendicular cut with no further finishing required. Pullmax does it better . . . faster.

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East and Midwest,  
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Your phone book lists the nearest Alcoa sales office under "aluminum". For prompt quotation, technical books and help based on 62 years of aluminum knowledge . . . call there or write ALUMINUM COMPANY OF AMERICA, 19038 Gulf Building, Pittsburgh 19, Pa.

# ALCOA Aluminum DIE CASTINGS



EDITORIAL INDEX—PAGE 3

# ccj COMMERCIAL CAR JOURNAL

THE MAGAZINE FOR FLEET OPERATORS

## The 14th Fleet Operators' Reference Annual **APRIL, 1950**

300 manufacturers bought 260 pages of advertising in the April, 1949, Fleet Operators' Reference Annual of COMMERCIAL CAR JOURNAL—to bring the value of their products to the attention of the operators of the 25,000 largest truck and bus fleets in the world.

They did this because this issue of COMMERCIAL CAR JOURNAL goes right to the people in these fleets who buy the products they have to sell.

### The Most Valuable Issue of Any Truck and Bus Fleet Maintenance Magazine This Year

—will be the 14th Fleet Operators' Reference Annual, out in April.

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This April issue will cover: Truck and Bus Maintenance . . . Truck and Bus Selection and Operation . . . Truck, Bus and Trailer Statistics. Included, for the first time this year, will be complete specification tables and complete maintenance specifications on standard American buses.

This issue is your Number 1 advertising buy in the truck and bus fleet maintenance field in 1950. Final forms close March 20.

## COMMERCIAL CAR JOURNAL

A Chilton Publication

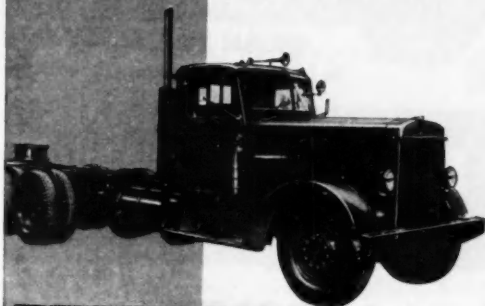
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AUTOMOTIVE INDUSTRIES • CHILTON Automotive BUYER'S GUIDE

*Come to Automotive Headquarters*

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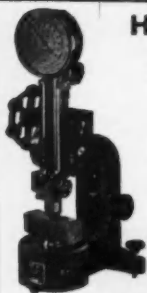
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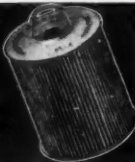
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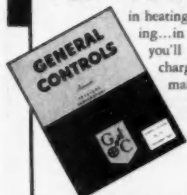
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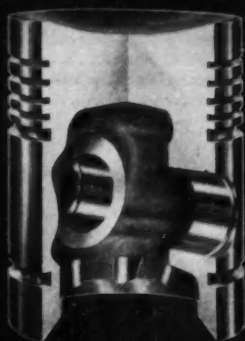
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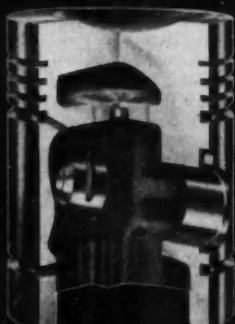
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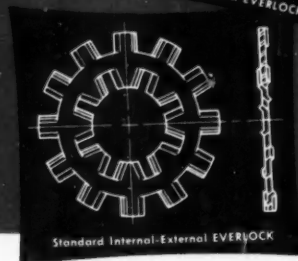
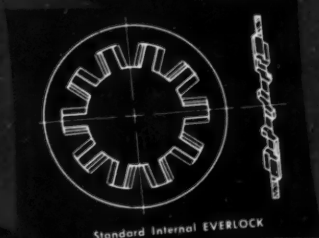
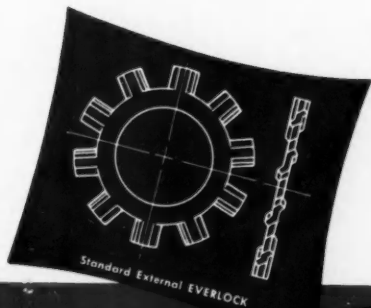
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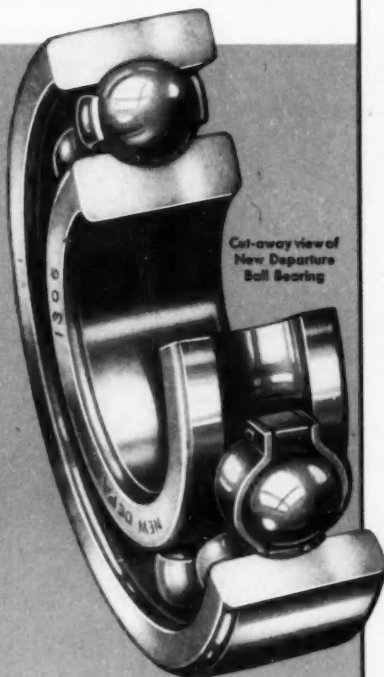
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2   
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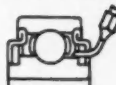
3   
Its inherent resistance to load is greatly increased by curved raceways which, under load, are nearly filled by an arc of the ball. "Point contact" talk is the bunk. Actually, its contact is an ellipse, like this: 

4   
This is how a ball resists thrust (axial loads) as well as radial loads—like a bicycle on a banked track.

5   
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